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Bertha Joseph Ngereja

Exploring the Role of Soft Factors in Enhancing Digitalization Project Success

A Multi-layer Perspective Emphasizing the Influence of Individual, Team, and Organizational Learning

Doctoral thesis

NTNU
Norwegian University of Science and Technology
Thesis for the Degree of Philosophiae Doctor
Faculty of Engineering
Department of Mechanical and Industrial Engineering

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There is no pure love than that of a father to his daughter(s). I dedicate this thesis to my loving and cherished late father and sister, who both passed during the period of my PhD research. My father who cheered every little step I took and showed me what it is to have a best friend; my sister whose footsteps I followed; I will forever cherish all the love they poured into me over their lifetime.

Preface

This thesis has been written and submitted at the Norwegian University of Science and Technology (NTNU) to qualify for the degree of Philosophiae Doctor (PhD) at the Norwegian University of Science and Technology (NTNU), Faculty of Engineering, Department of Mechanical and Industrial Engineering in Trondheim, Norway.

Digital transformation has significantly influenced various aspects of our lives, particularly our work and wellbeing. Such influence became evident to me during my time as a field engineer in the oil and gas industry, where I spent four years working offshore. There, I witnessed the introduction of new digital technologies and experienced firsthand the influence of digital transformation, not just in technical aspects, but also in terms of soft factors such as job security and organizational changes. This period raised many questions and concerns for me and my colleagues, especially as job cuts began.

Realizing the gaps in managing digital transformation, most especially pertaining to digitalization projects, I was motivated to explore further soft factors which is how I started my research journey. I pursued first a master's degree in project management and then this Ph.D. My research focus has been on soft factors, prioritizing people in project management, especially in the context of digital transformation. Throughout my research, I learned that many digitalization initiatives fail, highlighting the need for dedicated research on this topic. This thesis explores this area by combining knowledge from digital transformation and soft factors within project management, providing insights for successful management of digitalization projects.

As the research evolved, I noticed a growing research trend emphasizing the importance of focusing on people in digital transformation. This shift indicates a recognition by leaders of the crucial role people play in such initiatives. My research offers valuable insights for practitioners, such as project managers and leaders in

digital transformation, contributing to the body of knowledge in project management and encouraging further research in this field.

This thesis is not the finale of the work related to soft factors in the digitalization context, but a steppingstone for further exploration into the topic. The increasing citations of my published work (although very recently published) indicate a growing interest in this area, which I am proud to contribute to so far. This journey has been shaped by many, including my supervisors, interview and survey participants, colleagues, and the Projects for the Digital Transformation (ProDIT) project, which facilitated my international learning experience during the journey and exposed me to different organizations undertaking digitalization projects, which facilitated me to gain deeper understanding of several aspects regarding such projects.

Finally, this thesis is built on six papers which holistically provide practical insights for managing digitalization projects, identifying critical factors and strategies to overcome challenges, thereby promoting successful implementation and management of these types of projects.

Acknowledgements

I would like to take this opportunity to express my profound gratitude to the many individuals and entities who have been instrumental in the whole PhD project duration. Writing this thesis would not have been possible without the support of my supervisors, family, friends, colleagues, and mentors from all over the world. I would like to express my deepest appreciation to everyone.

First and foremost, I am deeply indebted to my main supervisor, Associate Professor Bassam Hussein, for his unwavering guidance, mentorship, and invaluable insights throughout this period. His dedication to my academic and personal growth has been truly remarkable. I extend my heartfelt thanks to my co-supervisor, Professor Carsten Wolff for his guidance, valuable feedback, constructive criticism, and scholarly contributions that have greatly enriched the quality of this work.

My sincere appreciation goes to my colleagues and fellow students from NTNU and abroad who have provided support, encouragement, and stimulating discussions during this academic journey. Epiphania Kimaro for being a remarkable support system during this time; Dr. Neema Opiyo and Dr. Stanslaus Mwampeta for the motivation and inspiration; Nargiza Mikhridinova for both life and research related discussions we had in different countries throughout the PhD time; Dr. Edwar leonardo Sastoque for the inspiration and wisdom; Siss Kristin Frivik, Alessia Bellini, Bejtush Ademi, Muluken Shibru Zeberga, Reynaldo Conedera and everyone in the department for all the helpful discussions around the office.

I am deeply thankful to my big and supportive family for their unwavering support of this doctoral pursuit. My mothers Gaudentia and Hermenegilda, my sisters Honoratha, Esther, Catherine, Pauline and Elizabeth, and my brothers Barnabas, Sebastian, and Isaac. Your belief in me has been a constant source of motivation.

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I want to express my gratitude to all the research participants who generously shared their time and insights, making this project possible. This thesis would not have been possible without the collective contributions and support of all these individuals and organizations. Thank you for being an integral part of this academic milestone.

Last but not least, thanks to the Almighty God for being my God and for being faithful!

TO GOD BE THE GLORY

Abstract

Over the past two decades, there has been a significant increase in the adoption of digital technologies within organizations, leading to the increase of implementation of digitalization projects. These projects are strategic initiatives that leverage digital technologies to facilitate organizational transformation. Despite their growing trend of undertaking digitalization projects in various sectors, these projects often experience high failure rates. One contributing factor to these outcomes is the tendency to prioritize technical factors and paying less attention to soft factors. Furthermore, digitalization projects have yet to gain widespread recognition within the project management field. This lack of popularity has resulted in a lack of widespread knowledge focused specifically on soft factors for these types of projects.

The aim of this thesis was to explore critical soft factors in the context of digitalization projects, to better understand how such factors can contribute to the success of such projects. This research addresses three specific questions, employing a three-phase approach similar to the dual funnel model. Following the dual funnel model, each segment of the dual funnel (top, middle, and bottom) yielded insights from various papers, each contributing to addressing one or more of the following three research questions:

RQ1: What are the challenges that organizations face in implementing digitalization projects?

RQ2: How do different soft factors rank in terms of their influence on the successful implementation of digitalization projects

RQ3: What strategies and approaches have proven most effective in overcoming challenges related to the implementation of the highest ranking soft factor in digitalization projects?

The thesis is divided into two parts, where Part I presents the summary of the research conducted and integrates the theoretical background and key findings. Part II presents the 6 papers included in the thesis.

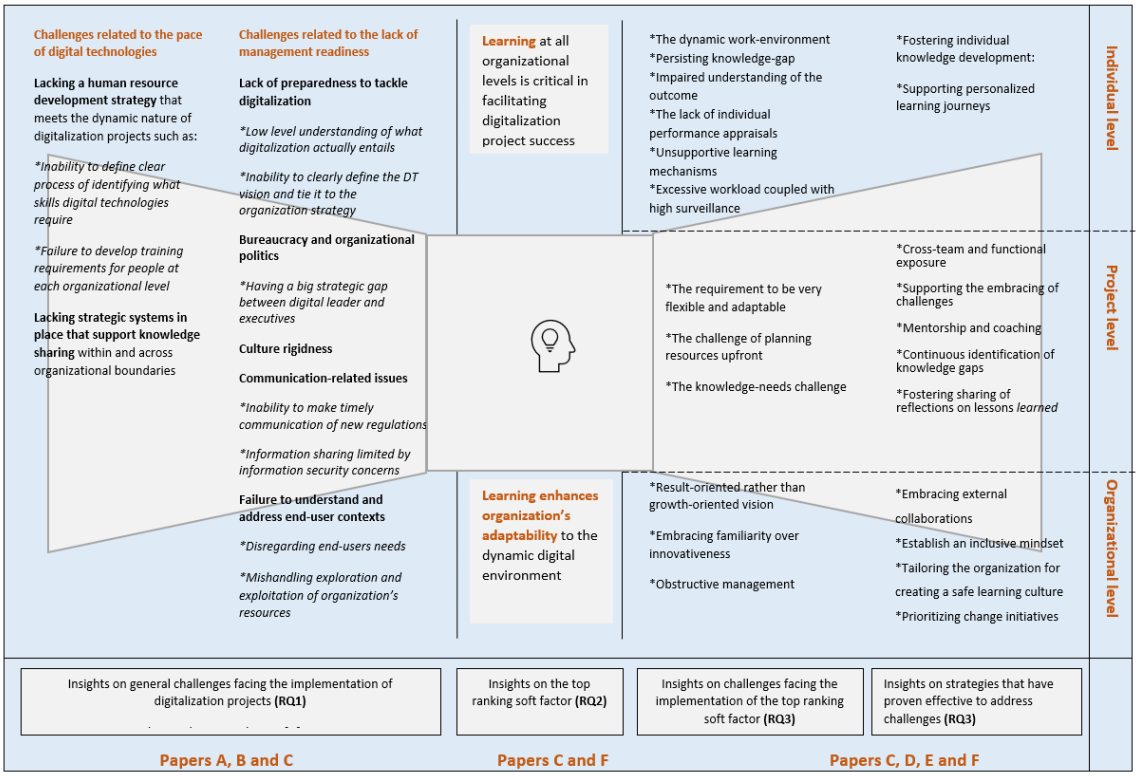
This research was not as straightforward as it might seem. Changes were incorporated throughout the process in response to emerging research findings. The research incorporated various qualitative methods such as interviews, case study, open-ended questionnaire, and archival data (document). In addition, a quantitative method was also incorporated through surveys. However, only one paper employed mixed methods incorporating both interviews and a survey.

Research Question 1 (RQ1) is primarily explored in Papers A, B and C. Paper A explores the interplay of soft factors in managing digitalization projects, revealing two key insights: firstly, it identifies three critical actors essential for the success of digitalization projects; secondly, it illustrates the inter-relationships among soft factors within the context of digitalization projects. Paper B examines the challenges in digitalization projects, emphasizing the crucial role of soft factors in managing the interactions between three key elements namely innovation, digital technologies, and organizing. It also points out three central factors in integrating these pillars which are team commitment, effective leadership, and a positive working environment. Paper C focuses on identifying the hinderances encountered in digitalization projects, highlighting the challenges involved in implementing and adopting such projects.

Research Question 2 (RQ2) is primarily addressed in Paper C and partially in Paper F. Paper C identified eight critical soft factors that are highly influential in the successful implementation and adoption of digitalization projects, with learning emerging as the top-ranked factor. This provides a clearer understanding of the priority and impact of these factors in the successful implementation of digitalization projects. Meanwhile, Paper F attests to the importance of learning for successful digitalization project outcomes.

Research Question 3 (RQ3) is primarily addressed in Papers D, E, and F, with additional insights from Paper C. Paper C presents an integrated framework, demonstrating that successful implementation and adoption of digitalization projects require readiness at multiple levels: organizational, project-based, and individual. Paper D focuses on the factors that hinder and facilitate learning within digitalization projects. It identifies key enablers such as the nature of the work, employee willingness, support from top management, and a supportive work environment. Paper E explores the "knowing-doing gap," highlighting the discrepancy between the awareness of challenges in digitalization projects and the actions taken to address them. It reveals that while employees generally show a willingness to learn and adapt to digitalization changes, there is often a lack of similar commitment from top management to support learning and foster an environment conducive to it. Paper F focuses on the factors that add uncertainty to the project environment which then leads to identifying the challenges in managing digitalization projects. In addition, Paper F investigates strategies for effectively tackling the challenges posed by uncertainty in digitalization projects, offering insights and approaches to managing such uncertainty.

The main contributions of this thesis provide insights on the holistic management of digitalization projects through a learning-focused approach. This involves incorporating perspectives from all three levels: individual, project, and organizational, to gain a comprehensive understanding of the factors driving success and the crucial interrelationships among these levels. Focusing solely on one level risks missing other challenges and overlooks potential solutions critical for effectively addressing these challenges. This thesis underscores the importance of an integrated approach, as illustrated below, to ensure that learning and response strategies encompass all organizational tiers, thereby effectively navigating the complexities inherent in digitalization projects.



The theoretical contributions of the thesis can be summarized as follows:

- Conceptualizing the interconnectedness/ interrelations of soft factors in the digitalization context
- Providing a comprehensive overview of soft factors through a framework for the successful implementation and adoption of digitalization projects
- Bringing a new perspective on learning within the digitalization context, highlighting the significance of continuous learning and adaptability within the rapidly evolving landscape of digital transformation.

The practical contributions of the thesis can be summarized as follows:

- Placing emphasis on viewing of soft factors holistically and implemented in unison to facilitate higher effectiveness.
- Categorization of soft factors at different levels facilitates targeted identification of skills ensures that the right competencies are developed or acquired at the right organizational level, enhancing the overall effectiveness and success of digitalization initiatives.
- Ranking the soft factors enables practitioners to control the highest value factors to increase the success rate of digitalization projects and to identify the core elements that need attention at various organizational levels.
- Providing multi-level guidance, integrating individual, project, and organizational perspectives, that enables us to understand the sources of uncertainty in digitalization projects, where they occur organizationally, and how to address them effectively.

Abbreviations

ACAP	**Absorptive Capacity**
AI	Artificial Intelligence
CDO	Chief Digital Officer
CEO	Chief Executive Officer
CSF	Critical Success Factors
CTO	Chief Technical Officer
DT	Digital Transformation
DTI	Digital Transformation Initiative
DP	Digitalization Project
IJPM	International Journal of Project Management
PACAP	Potential Absorptive Capacity
PMJ	Project Management Journal
RACAP	Realized Absorptive Capacity
SJR	Scimago Journal & Country Rank
SLR	Systematic Literature Review
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
VUCA	Volatility, Uncertainty, Complexity and Ambiguity
WEF	World Economic Forum

Declaration of authorship

Paper ID	Title	Declaration of authorship
Paper A	A Retrospective Analysis of the Role of Soft Factors in Digitalization Projects: Based on a Case Study in a Public Health Organization in Trondheim-Norway **Status**: Published in: 2020 IEEE European Technology and Engineering Management Summit (E-TEMS) **Available at:** doi: 10.1109/E-TEMS46250.2020.9111790	The PhD candidate is the first author. The PhD candidate collected and analyzed the data about the project from the existing documents. The PhD candidate wrote most of the paper.
Paper B	Insights on using project-based learning to create an authentic learning experience of digitalization projects **Status**: Published in: 2020 IEEE European Technology and Engineering Management Summit (E-TEMS) **Available at:** doi: 10.1109/E-TEMS46250.2020.9111829	The PhD candidate is the second author. The data collection was done by the first author. The PhD candidate contributed to the analysis and discussions and wrote about 30% of the paper.
Paper C	A Comparison of Soft Factors in the Implementation and Adoption of Digitalization Projects: A Systematic Literature Review **Status**: Published in: International Journal of Information Systems and Project Management **Available at:** doi: 10.12821/ijispm120204	The PhD candidate is the first author. The PhD candidate performed the systematic literature review and wrote most of the paper

Paper D	An examination of the preconditions of learning to facilitate innovation in digitalization projects: a project team members' perspective **Status**: Published in: International Journal of Information Systems and Project Management: Vol. 9: No. 2, Article 3. **Available at:** https://aisel.aisnet.org/ijispm/vol9/iss2/3	The PhD candidate is the first author. The PhD candidate collected and analyzed the data. The PhD candidate wrote most of the paper.
Paper E	Employee learning in the digitalization context: An evaluation from team members' and project managers' perspectives. **Status**: Published in: Procedia Computer Science, 196, pp.902-909. **Available at:** https://doi.org/10.1016/j.procs.2021.12.091	The PhD candidate is the first author. The PhD candidate was responsible for data collection. The PhD candidate performed data analysis and wrote most of the paper.
Paper F	Exploring the impact of absorptive capacity to navigate the challenges of uncertainty in digitalization projects **Status**: Under review by the International Journal of Managing Projects in Business	The PhD candidate is the first author. The PhD candidate was responsible for data collection through 17 interviews, a focus group discussion, and a survey. The PhD candidate performed data analysis and wrote most of the paper

PART I:

THEORETICAL BACKGROUND AND KEY FINDINGS

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1 Introduction

This chapter (i) discusses the theoretical background, (ii) motivation for the thesis and (iii) presents the study objectives.

1.1 Background

Over the past two decades, the swift rise of digital technologies has marked one of the fastest adoption rates in history (Sabbagh et al., 2012). Digital transformation has attracted global interest, reshaping businesses, and touching every aspect of human life with the embrace of these technologies (Kraus et al., 2021). Today's organizations are faced with a clear choice: either adapt to the digital era or risk falling behind (Schreckling & Steiger, 2017, p. 23). As a result, to maintain their competitive edge, more organizations are diving into digitalization across various industries (Kraus et al., 2021).

To capitalize on the opportunities presented by digitalization, organizations are integrating digital technologies into both existing and new processes (Denner et al., 2018). This integration often occurs through projects (Lehnert et al., 2016; Kerzner, 2013), hence the term *'digitalization projects*,' which is the focus of this thesis. While the term *'digitalization projects'* has not yet become widely popular in project management research, it is not a new concept in the context of digital transformation. Recent research indicates a growing interest in digitalization projects, specifically aiming to define their unique characteristics (Barthel & Hess, 2019, 2020). However, despite considerable efforts to define them, multiple definitions exist without a consensus on any single one.

While there is no single agreed-upon definition of digitalization projects, there seems to be a consensus on two characteristics. First, digitalization projects involve the introduction or use of digital enablers (Barthel & Hess, 2020; Garavaglia & Petti, 2013; Grahn et al., 2020; Sept, 2020). Second, digitalization projects are undertaken to spearhead the organization’s digital transformation process (Barthel & Hess,

2020; Henriette et al., 2015; Sanchez-Segura et al., 2021). Consequently, decision makers in organizations operating in the current business environment concur that in order to survive, implementation of digitalization projects is inevitable (Kurti & Haftor, 2015). However, such initiatives should not be underestimated because, like every organizational process, they carry their own risks (Kraus et al., 2021), challenges, and barriers that hinder their success.

Digitalization is characterized by volatility (i.e., constant and massive changes), uncertainty (i.e., lack of predictability), complexity (i.e., multitude of interrelated and self-organizing actors), and ambiguity (i.e., confounding cause and effect relationships), referred to as a VUCA world (Bennett & Lemoine, 2014). Digitalization projects are identified as complex undertakings, characterized by high uncertainty and frequent changes, due to challenges that cross-cut dimensions such as technology, innovation, and organization (Hafseld et al., 2021). Integrating relevant knowledge into daily routines is vital for successful project outcomes (Dultra-de-Lima & Brito, 2022).

For digitalization projects, proper planning is essential to prevent setbacks like delays and cost overruns (Jun et al., 2011; Mielli & Bulanda, 2019). Amid the rapid technological changes, organizations face challenges in decision-making (Davenport & Westerman, 2018). While they recognize the need to adapt, their inherent limitations can hinder their ability to respond effectively to external changes (Liao et al., 2003; Tripsas & Gavetti, 2017). Ultimately, an organization's success hinges on its ability to align with the external environment (Lengnick-Hall & Beck, 2005).

1.1.1 Why the low digitalization projects success rate?

Recent studies highlight an increase in the rate of digitalization project implementation within organizations (Badewi, 2022). However, the success rate of such projects has been low (Ross et al., 2019). Reports from Forbes, McKinsey, HBR.org, From.digital, and HarveyNash/KPMG indicate a success rate of only 16-30%

for digital transformation initiatives between 2012 and 2019 (Sanchez-Segura et al., 2021). Despite the push for digital transformation, a consistent 30% success rate suggests that most digital transformation initiatives stall (Bucy, 2021). A McKinsey survey revealed that fewer than 33% of respondents felt their organizations successfully implemented and sustained digital initiatives, nevertheless, even the successful initiatives often miss out on full financial gains due to value leakage throughout the project (Bucy, 2021).

Several factors contribute to the low success rates of digitalization projects. A 2019 survey of corporate directors and CEOs found that while top management views digital transformation as a primary concern, a staggering 70% of these initiatives fall short of their objectives, resulting in a loss of approximately $900 billion in investments (Tabrizi et al., 2019). This highlights a disconnect between strategy and execution, often termed the "*strategy-execution gap*." To bridge this gap, it is essential to rethink traditional project management approaches and adopt methods that allow for swift action in the unpredictable and risky digital landscapes (Li, 2020).

The human i.e., soft side of digital transformation comprises different meanings (Dąbrowska et al., 2022), therefore it is important to distinguish which one this thesis aligns with. Researchers have addressed human side of digital transformation by focusing on either employees, top management, teams, and the organization's ability to find the right mix of talents (Karimi & Walter, 2015), or in the skills, abilities, and orientations of employees and managers (e.g., (Reljic et al., 2021; Van Laar et al., 2017). Other researchers have discussed the co-existence and interdependence of humans and digital technologies such as robots and artificial intelligence (AI)), along with considerations of their emotional, social, and moral implications (Dąbrowska et al., 2022). This thesis aligns more with the first view and does not focus on the co- existence and interdependence of people and digital technologies.

One of the causes for the low success rate of digitalization projects is approaching digital transformation as a technical issue rather than a people-centric issue. Researchers acknowledge the importance of technology as a catalyst or driver of digital transformation, but concur it is people who add value in the process and outcomes (Bajer, 2017; Del Rowe, 2017; Kohnke, 2017; Kraus et al., 2021)**.** Thus, the management of people and organizational issues i.e., *soft factors* need to be considered equally with *technical* factors, if not more in all contexts, but most especially in the context of digital transformation (Carvalho & Rabechini Junior, 2015; Ghazinejad et al., 2018; Hussein & Hafseld, 2016; McLeod & MacDonell, 2011). Soft factors play a crucial role in project management. Mastering soft factors has been shown to reduce the number of failed or challenged projects (Pinkowska, 2007).

In the context of digitalization, organizations must understand that success goes beyond mere technological capabilities (Timonen & Vuori, 2018). While technology is a driver, organizational culture and ideas are the true forces behind digitalization (Saarikko et al., 2020). As such, soft factors, which are becoming increasingly vital with technological progression (Tvedt & Dyb, 2019), play a pivotal role in achieving success (Artemenko, 2020; Rieke, 2019; Semm et al., 2018). It is essential for organizations to foster collaboration and adapt to changes in competencies, structures, leadership, and culture (Henriette et al., 2015; Onar et al., 2018).

The report by McKinsey highlights value losses across various project phases: 22% during target setting; 23% in planning; 35% in implementation; and 20% post-implementation (Bucy, 2021). The significant loss during the implementation phase highlights its criticality. While much research on digitalization centers on identifying digitalization ideas and opportunities (Denner et al., 2018), there is a gap in guidance on successful implementation (Baier et al., 2022), which this thesis seeks to address.

1.1.2 The role of soft factors in digitalization projects' success

While *'digital transformation'* and *'soft factors'* have individually garnered research interest, viewing both aspects simultaneously remains underexplored. Studies have addressed digital transformation success in various contexts: Gimpel et al. (2018) offer a framework for established firms, (Soluk & Kammerlander, 2021) discuss family-owned firms, and Lichtenthaler (2020) considers technology and market factors. However, as Baier et al. (2022) note, these create *'isolated pockets of understanding*.' Bridging these two knowledge areas could enrich both research and practice.

A 2023 editorial in the Corporate Communications International Journal highlights soft factors as key contributors to digital transformation failures. The editor underscores the significance of considering stakeholders, especially customers and employees, as their acceptance is vital for successful outcomes (Topić, 2023). Tabrizi et al. (2019) suggests that the best way to attain such acceptance is by understanding what matters to people. As Topić (2023) puts it, "*digital transformation needs humans, soft skills and it needs a heart*" and should be approached from a multi-stakeholder viewpoint. This thesis explores soft factors in digitalization projects and offers insights for their successful execution.

To provide guidance on successful digitalization project implementation, (Baier et al., 2022) identified critical success factors (CSFs). They pinpointed 38 factors, grouped into seven categories: strategy, structure, people, process, project, culture, and technology. Notably, 10 of these factors were previously unexplored in research. Their findings suggest that while digitalization challenges existing knowledge, it doesn't make it obsolete. The study emphasizes the need for a unique blend of success factors, drawing from business process management, project management, and digitalization domains.

1.2 Bridging the research gap

Research on successful digitalization projects is emerging, leading to conceptual ambiguity, and limited scholarly development (Appio et al., 2021; Baier et al., 2022; Morakanyane et al., 2017). This thesis addresses this gap by examining the influence of soft factors within the context of digital transformation, an area yet to be thoroughly explored. Weingarth et al. (2019) note the limited attention given to soft factors in digital transformation, while Viniegra (2016) emphasizes the need to focus on the softer aspects of information technology management.

In a study by Girrbach (2018), interviews with top managers revealed that organizations struggle with employee acceptance of digitalization due to an overemphasis on technical aspects rather than soft factors. While technology is vital, its overemphasis can limit the benefits of digital transformation by narrowing strategic options and overlooking other potential benefits (Lichtenthaler, 2020). When it comes to digitalization endeavors, challenges stem from people-related factors (i.e., soft factors) (Topić, 2023).

1.3 Personal motivation

During my tenure as a field engineer in the oil and gas sector, I witnessed the rollout of digitalization projects firsthand. My role, which spanned office tasks and visits to both offshore and onshore rigs, was significantly impacted by the company's digital transformation. As operational-level changes were introduced, I felt unprepared for the rapid shifts that affected my daily responsibilities. Digitalization disrupted established processes and added tasks that seemed less pertinent to my performance. Balancing the adoption of these new digital methods while maintaining quality work became a challenge

Amidst the digital transformation, the company also faced numerous layoffs across departments, instilling fear, and uncertainty about job security. This led to an

atmosphere of dread, with employees constantly wondering, "*Am I next?*" and avoiding eye contact with HR personnel in the hallways. I recall colleagues arriving with smiles but leaving in tears. This climate of fear and uncertainty negatively impacted our performance. In hindsight, better communication and involving employees in the process could have alleviated some of the anxiety. Early notice about potential job risks would have allowed employees to prepare, and the company could have avoided the plummeting morale during its transformation.

Inspired by my workplace experiences in a technologically advanced setting, I transitioned into research. While the organization heavily emphasized technical solutions, soft factors were often overlooked. Experiencing digitalization projects firsthand highlighted the importance of involving all organizational levels in such initiatives. This sparked my research interest. I have come to believe that while technical challenges may seem complex, they often have straightforward solutions. In contrast, soft issues, seemingly simple, can be complex. My goal is to shed light on the significance of soft factors in the digital transformation context and provide actionable insights for practitioners.

1.4 Scope and limitations

To address the research objectives, this study focuses on three organizational levels: (i) top management, responsible for decision-making and strategy, (ii) middle management, including project managers overseeing the projects, and (iii) employees, encompassing both project team members and end-users expected to adapt to the project outcomes. This thesis exclusively considers internal stakeholders and excludes external perspectives, such as external customers and the broader society.

Furthermore, this thesis theoretically intersects two research domains: digital transformation and project management, as depicted in Figure 1-1. While it relates to digital transformation, the primary focus is on digitalization projects, while

viewing digital transformation in the broader context. In the realm of project management, the emphasis is on the implementation phase and soft factors. Although both hard and soft factors are vital for success, this study focuses on the latter.

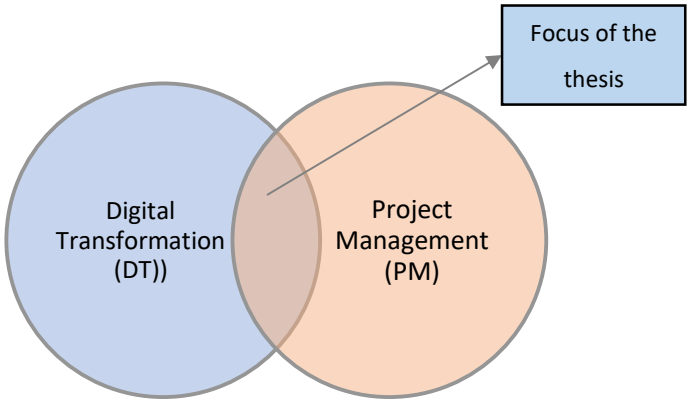

Figure 1-1: The focus of this thesis at the intersection of digital transformation and project management

1.5 Research objectives and steps taken to address them

This study aims to integrate perspectives of people at three levels in the organization to address research objectives, specifically top management, middle management, and employees. The perspectives will be integrated to address three research questions below:

RQ1: What are the challenges that organizations face in implementing digitalization projects?

RQ2: How do different soft factors rank in terms of their influence on the successful implementation of digitalization projects

RQ3: What strategies and approaches have proven most effective in overcoming challenges related to the implementation of the highest ranking soft factor in digitalization projects?

This thesis is based on 4 peer-reviewed journal papers, in addition to 2 peer-reviewed conference proceedings. Each paper contributes towards addressing the thesis research objectives. The research was undertaken in three phases where each phase led to development of insights in one or more peer-reviewed papers. These phases are; exploratory phase, turning point phase and the main study phase. The steps adopted a dual funnel process as shown in Figure 1-2 below. Two research areas which are *"isolated pockets of understanding",* are used as inputs which are poured into the top part of the dual funnel. These inputs are existing knowledge on project management, digital transformation, and practical experience i.e., empirical data.

The exploratory phase explores in a general manner the soft factors in digitalization projects. This phase produced insights in 2 papers **(Paper A and Paper B).** The second phase, where the two funnels, a reduction process occurs and some knowledge and understanding passes to the next stages until the *'turning point'* is reached. At this point the research identified and ranked the soft factors based on their influence on the success of digitalization projects, where the highest ranking factor was to be explored further **(Paper C).** The third phase is quality-oriented, focusing on one soft factor to gain deeper and enriched insights. In this phase, further investigation is conducted to generate a deeper knowledge and understanding which contributes to the existing body of knowledge. The third phase produces insights in 3 papers **(Paper D, E and F).**

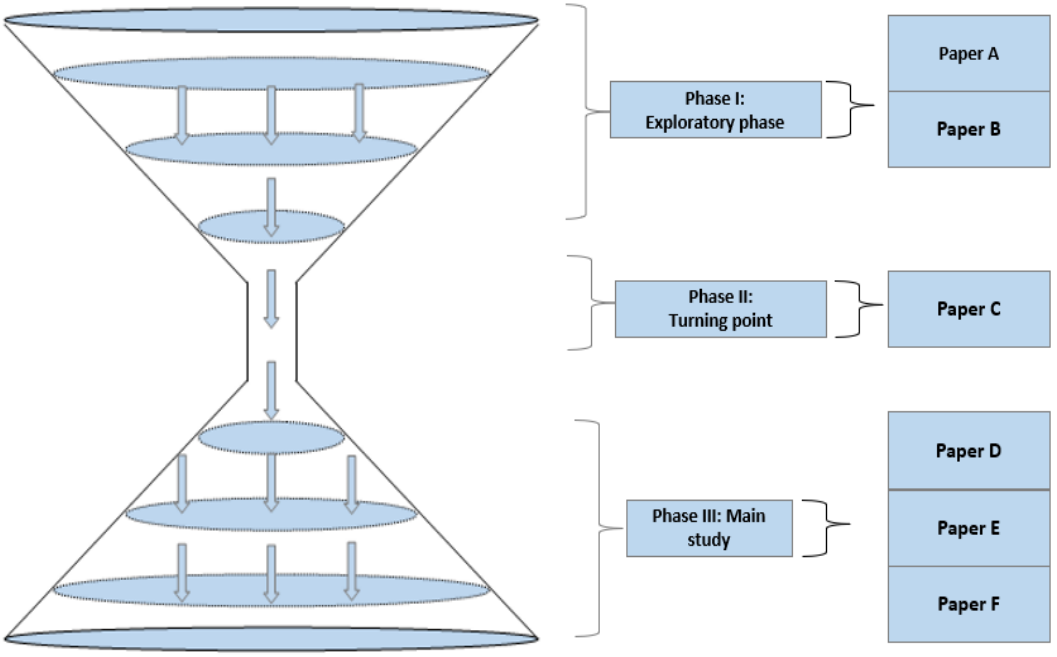

Figure 1-2: The dual funnel research steps taken for this thesis

Table 1-1 below shows the contribution of each paper towards addressing the research objectives

Table 1-1: Contribution of each paper in addressing the research questions

Research questions	Paper A	Paper B	Paper C	Paper D	Paper E	Paper F
RQ1	✓	✓	✓			
RQ2			✓			✓
RQ3			✓	✓	✓	✓

1.6 Thesis structure

The thesis is divided into two parts. Part 1 encompasses the primary thesis spread across six chapters. Chapter 1 introduces the research, detailing its background, rationale, motivation, scope, and limitations. Chapter 2 outlines the theoretical foundation and identifies the research gap. Chapter 3 delves into the research methodology, following Saunders et al. (2019), explaining each layer from research philosophy to data collection and analysis. Chapter 4 showcases findings from each phase, while Chapter 5 integrates and discusses these findings. Chapter 6 concludes the thesis, highlighting its contributions and suggesting avenues for future research. The thesis structure is shown in Figure 1-3.

Part 2 contains the papers addressing the thesis objectives. Since this is a paper-based thesis, Parts 1 and 2 should be read in tandem for a comprehensive understanding. Information available in the papers will not be reiterated throughout the thesis; instead, the relevant paper will be mentioned.

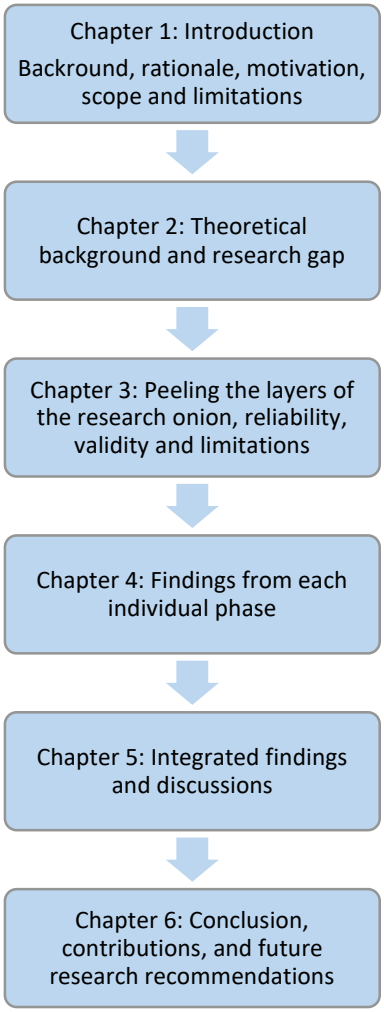

Figure 1-3: Thesis structure

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2 Theoretical Background

This chapter begins with a discussion on project management, highlighting the role of people-related success factors (termed "soft factors'' in this thesis) across various project phases. It delves into the influence of perception on identifying and implementing soft factors. The discussion then shifts to digital transformation, its challenges, and the distinct nature of digitalization projects. The chapter concludes with a focus on learning within the context of digital transformation, a theme that emerged during the research.

2.1 Project Management Schools

The field of project management has been explored from various perspectives over the years. Anbari (1985) identified five schools of thought, Söderlund (2002) pinpointed seven while Turner et al. (2013) recognized nine. The nine schools of thought by Turner et al. (2013) are presented in Table 2-1. Notably, all the schools listed by Turner et al. (2013) were previously identified by Anbari (1985) and Söderlund (2002). The research study presented in this thesis aligns with the 'success school' of project management, which emphasizes project success and failure.

Table 2-1: Schools of project management (summarized from Turner et al. (2013))

Project management school	How it looks at projects	What it focuses on
The *modelling school*	-looks at a project as a mirror to reflect and shape our understanding of it	Discusses both hard and soft systems. The hard systems focuses on optimization, and the soft systems focuses on clarification and making sense of the project and its environment
The *optimization school*	-Looks at projects as a machine because once a project is	Focuses on project definition, breaking down the project into smaller components, planning,

	mathematically defined and analyzed, its performance can be predicted	scheduling, estimating, project tasks execution and aims to achieve cost and time efficiency throughout the project for optimum results. Includes discussions and developments of several optimization tools such as Gantt or Bar charts, work breakdown structures, Program Evaluation and Review Technique (PERT), project crashing, resource constrained scheduling, Critical Paths Method (CPM)
The governance school	-Looks at the project as a legal entity	Topics such as Contract management, Governance on project and project organizations. Currently the focus has been on project, program, and organizational portfolio
The behavior school	-Looks at the project as a social system	Focuses on organizational behavior (OB), human resource management (HRM) in various settings such as in virtual settings, leadership profiles for different types of projects, power, and politics in projects and sponsor communication
The *decision school*	-Considers the project as a computer focusing on factors related to project initiation, approval, and funding as well as factors related to project completion, termination, and conclusions about project success or failure	Research in this school appears to be divided into two paths. The first is focusing on the decision making processes especially those made at early phases of a project and their impact on the overall project outcome. The second path focuses on the processing of information in projects viewing projects as vehicles for processing information and minimizing uncertainty
The process school	-Considers the project as an algorithm	The important aspect in this school is defining processes that should be

	because it provides a road map or structure with which a vision can be turned into reality	followed to achieve project objectives, thus the project-life cycle and management life-cycle are part of this school
The contingency school	-Considers the project as a chameleon. This means it acknowledges the difference between projects and project organizations, and advocates for different approaches of managing projects based on the type of project	In contributing to this school, research has highlighted different competencies and leadership styles for different projects and attempted to provide project categorization based on purpose or attributes of the project
The marketing school	-Views projects as billboards	Focuses on stakeholders including identification of stakeholder needs and managing stakeholders, marketing the project to the customers, and selling project management to top managers. Furthermore, this school addresses the disconnect that exists between project management and productivity and addresses how top managers view project management in the organization
The success school	-Views projects as a business objective	Focuses on the success and failure of a project. Project success is described using two important components which are project success factors and project success criteria.

2.2 Soft factors in project management

2.2.1 Definitions and terminologies

The term "*hard*" pertains to the rational and technical aspects of projects and project management, while *"soft*" refers to the human side (Gustavsson & Hallin, 2014). Both past and current literature concur that solely focusing on hard factors or skills is inadequate to ensure project success (Carvalho & Rabechini Junior, 2015; Mohagheghi & Jørgensen, 2017; Pinto & Prescott, 1988).

Research uses various terms to describe soft factors, as illustrated in Table 2-2. For the purposes of this study, the term *'soft factors'* is chosen and consistently used.

Table 2-2: Soft factors referred in existing literature

Soft factors terminologies	**Reference**
Soft factors	(Liu et al., 2011) (Tvedt & Dyb, 2019) (Girrbach, 2018) (Weingarth et al., 2019)
Human factors	(Pinto & Prescott, 1988) (Mohagheghi & Jørgensen, 2017) (Bauer et al., 2017) (Lenberg et al., 2017)
People factors	(Yang & Yang, 2013) (Wohlin & Ahlgren, 1995)
Critical factors	(Nah et al., 2001)
Intangible factors	(Homburg et al., 2003)
Non-technical factors	(Purna Sudhakar et al., 2011) (Pinkowska, 2007)
Organizational and managerial factors	(Gil-García & Pardo, 2005)

Recognition of soft factors increased in the 1980s (Homburg et al., 2003). This was accelerated by the Aloha Boeing 737 accident which happened to be the first of various significant events that focused attention on human factors in maintenance (Johnson & Hackworth, 2008). Consequently, since then, the interest in soft factors increased significantly. This is supported by most existing literature on soft factors not dating back older than 1990's (Ngereja & Hussein, 2019).

Soft factors represent the human-side of project management (Liu et al., 2011). Literature defines such factors as *"physical and psychological capabilities of the individual, like training, education and experience"* (Galar et al., 2011); "*behavioral aspects of management or human factors*" (Abdullah & Uli, 2007) or *"all non-technical aspects, which are difficult to quantify* (Pinkowska, 2007).

2.2.2 Soft factors in project-based settings

Soft factors are essential in project-based practices. A recent study by Deep et al. (2019) highlighted three soft factors critical for fostering collaboration: trust, commitment, and decision reliability. Trust, in particular, is emphasized in project management literature. It is seen as vital for stakeholder management (Karlsen et al., 2008), enhancing collaboration in project alliances (Galvin et al., 2021), facilitating information sharing (Kocoglu et al., 2011), driving innovation (Lewis, 2007), and refining the contracting process (Kadefors, 2004; Pinto et al., 2009). Maurer (2010) highlighted the significance of trust in project management, noting its influence by team composition and reward systems. Additionally, the commitment and support of top management are frequently emphasized in project management literature. Gutierrez and Hussein (2014) underscored the importance of top management support in handling project complexity. Zwikael (2008) suggested that varying top management processes should be tailored to different project contexts, such as culture and industry.

Extant research have recognized the importance of organizational, political, and human-related issues, and in more instances found these issues are important than technical issues in determining project success (Carvalho & Rabechini Junior, 2015; Ghazinejad et al., 2018; Hussein & Hafseld, 2016; McLeod & MacDonell, 2011). Table 2-3 below summarizes the relationship between success factors and soft factors identified in literature.

Table 2-3: The relationship between project success factors and soft factors

Reference	**Contribution to the understanding of project success factors**	**Direct relation to soft factors**	**Comments**
(Slevin & Pinto, 1987) (Pinto & Prescott, 1988)	The importance of project success factors changes significantly depending on the project life cycle stage	✓	7 out of 10 identified success factors are soft factors
(Cooke-Davies, 2002)	12 critical success factors for projects are identified	(✓)	None is directly related to soft factors. Author highlights this finding as strange and states that all factors have the "people" element woven into them.
(Mohagheghi & Jørgensen, 2017)	6 success factors to facilitate success of software projects.	✓	The success factors are human related
(McLeod & MacDonell, 2011)	A classification framework of factors that influences software project outcomes is presented.	✓	People characteristics, actions, interactions, and relationships shape project outcomes in multiple ways such that their understanding is necessary

(Carvalho & Rabechini Junior, 2015)	Focusing on the hard side of risk management does not suffice for effective uncertainty management	✓	Soft skills have significant and positive impact of project success
(Ghazinejad et al., 2018)	Provides understanding of trust, openness, and commitment on project performance and outcomes in innovation research projects	✓	All 3 factors are soft/human factors.

2.3 Soft factors in the digitalization context

Tvedt and Dyb (2019), emphasize that as technology advances, the significance of soft factors will increase. These factors, often *"hidden"* due to their intangible nature, can be easily overlooked. Digitalization introduces changes and new demands across various organizational facets, from structure and culture to processes (Larjovuori et al., 2016). This adds layers of complexity to digitalization projects (Hafseld et al., 2021). As digitalization intensifies, integrating soft factors into projects becomes even more intricate. Hence, there is a pressing need for research and practice to deepen their understanding of these factors in the digitalization context.

Understanding success factors in the 21st century aligns with comprehending them within the digital transformation landscape, given the era's advancements in the topic. A systematic review of 35 papers on people-related success factors in digital transformation, conducted during the research process of this thesis, underscores this trend. The review highlights a growing interest starting in the early 2000s, with a notable surge from 2018 onward, as depicted in Figure 2-1.

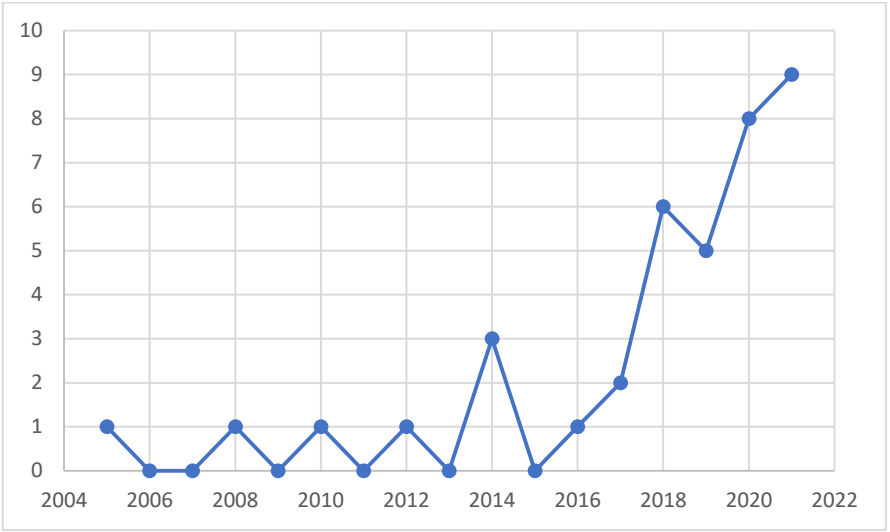

Figure 2-1: Publication trend on the topic of people-related success factors in the DT context

Project management has evolved with technological advancements (Wu, 2022). The integration of soft factors is increasingly critical for effective operations management amid digitalization in organizations (Wu, 2022). It is recognized that project success hinges on people, not just processes and systems (Cooke-Davies, 2002). A skilled and engaged workforce is central to successful digital transformation (Weston, 2017).

2.3.1 Classifications and categorizations and inter-relationships

Research has aimed to clarify success factors in digital transformation, with efforts ranging from listing to categorizing these factors. Jacobi and Brenner (2018) extracted ten factors into three categories: 'leadership and vision,' 'corporate processes and structure,' and 'culture and people.' Similarly, Tijan et al. (2021) grouped success factors for digitalization projects into organizational, environmental, and technological categories. Baier et al. (2022) identified seven categories of success factors for Product Development Processes (PDP): strategy, structure, culture, people, process, project, and technology.

It is essential to clarify the interdependencies among success factors for effective organizational implementation (Ngereja et al., 2020; Sandkuhl et al., 2020). Research has explored how these factors interrelate in digitalization project success. Hsieh et al. (2003) highlighted the need to understand cultural differences in digital project collaboration. Larjovuori et al. (2016) examined the impact of leadership and employee well-being on digitalization, while Ngereja et al. (2020) offered a framework outlining the interplay between various soft factors.

2.3.2 Critical success factors

Research emphasizes human factors as the bedrock of Critical Success Factors (CSFs) for digitalization projects. Hussein et al. (2020) cite team commitment, leadership, and a positive work environment as key. Trust and cooperation are highlighted by Tvedt and Dyb (2019), while (Pinkowska, 2007; West & Anderson, 1996) point to human resource management, communication, and leadership. Other CSFs include collaboration (Tronvoll et al., 2020), managerial and employee engagement and knowledge investment (Tijan et al., 2021), organizational culture (Kiron et al., 2016), and team capabilities (Hung et al., 2014).

Top management support and commitment are essential for the success of digitalization projects (Abollado et al., 2017; Fitzgerald et al., 2014; Hung et al., 2014; Jha et al., 2020; Larjovuori et al., 2016; Mikalef et al., 2019; Ouadahi, 2008; Schuchmann & Seufert, 2015). With top management responsible for strategy setting and employee engagement (Stoyanova, 2020). Consequently, research indicates that engaging frontline staff is equally crucial for successful transformation outcomes (Bandara et al., 2021; Barthel & Hess, 2020; Gil-García & Pardo, 2005; Hagen et al., 2021; Weston, 2017; Zhang et al., 2021).

The importance of strong leadership in digitalization projects is well-recognized, with the concept of a 'digital leader' emerging as pivotal (Fitzgerald et al., 2014; Larjovuori et al., 2016; Snow et al., 2017). Such leaders must blend technical

expertise with soft skills like team unity, change driving, risk-taking, inspiration, and fostering shared goals (Maedche, 2016). Additionally, negotiation, influence, and change management are crucial for digital leaders (Weingarth et al., 2019). Effective digital leaders are those who ask the right questions rather than just providing the right answers (Rogers, 2016).

Furthermore, the emergence of roles like the Chief Digital Officer (CDO) and Chief Transformation Officer (CTO) highlights the need for specialized leadership. It is important to define the distinct responsibilities of the CDO, CTO, and CEO (Chief Executive Officer), whereby the CEO is leading the company and a dedicated CTO is driving change initiatives (Bucy et al., 2016). The CEO should not be burdened with the task of leading the digital transformation and the changes that come with it..

Stakeholder engagement is also crucial for the success of digitalization projects, with particular emphasis on end-user involvement for support and acceptance (Abollado et al., 2017); Ngereja et al. (2020); (Wolf et al., 2018). People's acceptance of change is fundamental to project success (Weston, 2017). Additional factors include rewards and incentives (Ouadahi, 2008; Tvedt & Dyb, 2019) employee buy-in (Hartl & Hess, 2017; Lenberg et al., 2017; Roberts et al., 2021), and a dedicated team (Hussein et al., 2020) (Matturro et al., 2019). To secure employee buy-in for projects and changes, organizations should cultivate the right mindset, evaluate employee soft and technical skills, and utilize a digitalization strategy toolkit (Weston, 2017). Effective communication is key to ensuring employees feel valued and understand their role in the project. Additionally, addressing skill gaps by acquiring external expertise, including soft skills like emotional intelligence, is vital for creating an adaptable and inquisitive workforce. Moreover, investment in diverse learning environments and flexible pacing caters to individual learning preferences (Weston, 2017).

2.4 Digital Transformation, digitalization, and digitization

Digital transformation is multifaceted and complex, extending beyond merely incorporating digital technologies to change something in the business (Sandkuhl et al., 2020). It is a misconception to label any project involving digital tools as digital transformation (Soto-Acosta, 2020). True digital transformation signifies a fundamental change within the business, not just the adoption of digital solutions (Fitzgerald et al., 2014). The main purpose of digital transformation is to transform organizational business by integrating digital technologies, resulting in benefits like enhanced productivity, cost savings, and innovation (Moreira et al., 2018).

Managers often struggle with the various aspects necessary for digital transformation (T. Hess et al., 2016). While some view it merely as the adoption of digital technologies (Verina & Titko, 2019), it is more comprehensive, involving technology, management, and people. It is important to think about digital transformation in a broader perspective that includes organizational change, cultural shift, and customer focus, with the "people" element being paramount (Verina & Titko, 2019).

Nwaiwu (2018) reviewed ten digital transformation models from a business transformation standpoint, including *the six keys to success, digitization piano, digital orchestra, digital reinvention, digital innovation strategy, technology acceptance model 3, digital transformation framework, digital enterprise integrated management, and the unified theory of acceptance and use of technology (UTAUT2).* He discovered that while eight frameworks highlight areas of focus during transformation, only two provide detailed action plans for transformation. Additionally, six frameworks emphasize human resources actions, and four stress customer focus. These commonalities underscore a consensus on critical factors for successful digital business transformation (Nwaiwu, 2018).

Digital transformation reshapes work organization, affecting objectives, tasks, equipment, and workspace, and introduces new challenges in organization, qualification, employment, and leadership (Bauer et al., 2017). This evolution alters collaboration, demanding new worker qualifications such as continuous learning, proactive problem-solving, interdisciplinary approaches, continuous interaction with machines and cyber-physical systems, and advanced systems knowledge (Bauer et al., 2017).

2.5 Differences between digital Transformation, digitalization, and digitization

The terms *'digitalization'* and '*digital transformation'* have been used interchangeably by various researchers resulting in lack of clarity (Collin et al., 2015). The reason for this is due to the conceptual vagueness characterizing digital transformation and to the nascent stage of development of scholarly research related to the topic (Appio et al., 2021; Morakanyane et al., 2017). The implication is that currently, there is no unified view on the concepts or definition of digital transformation (Morakanyane et al., 2017). This highlights the importance of establishing a clear distinction between them.

Digital transformation refers to the impact of digital technologies on a company's business model, leading to new products, organizational structures, or process automation (T. Hess et al., 2016). Henriette et al. (2015) describe it as the business model evolution driven by digital technology application across society. After conducting a comprehensive literature review, digital transformation was defined as *"an evolutionary process that leverages digital capabilities and technologies to enable business models, operational processes and customer experiences to create value"* (Morakanyane et al., 2017).

The definition by Morakanyane et al. (2017) is comprehensive, framing digital transformation as an ongoing, technology-driven evolutionary process rather than

a final goal. It suggests that adopting digital technologies is a journey that continually affects traditional business strategies and, by extension, the organization and its people who experience the changes brought by digitalization (Collin et al., 2015)

Digitalization involves the "*the adoption, adaption, development, and management of innovative digital technologies within organizations, including the process of digitizing"* (Wiesboeck, 2018). Schallmo and Williams (2018, p. 6) describe digitalization as the *"fundamental changes made to business operations and business models based on newly acquired knowledge gained via value-added digitization initiatives."* It transforms products and services into digital formats, enhancing efficiency and customer experience (Pagani & Pardo, 2017; Zhang & Chen, 2023).

Conversely, digitization can be defined as "*digitally enabling analog or physical artifacts for the purpose of implementing said artifacts into business processes with the ultimate aim of acquiring newly formed knowledge and creating new value for the stakeholders*" (Schallmo & Williams, 2018, p. 5). Digitization, while not altering the core business, driving new models, or disrupting fundamental strategies, can yield substantial operational efficiencies and error reduction (Gobble, 2018). It generally shifts documentation processes from analog to digital without transforming value creation activities (Verhoef et al., 2021).

2.5.1 Digitalization projects

Organizations realize digital transformation through implementation of digitalization projects (Baier et al., 2022; Gertzen et al., 2022; Leyh et al., 2021; Sanchez-Segura et al., 2021). Li (2020) recommends treating digitalization projects as processes guided by strategy, which allows breaking down long-term digital transformation strategies into manageable short-term projects. This approach offers flexibility to adapt and align strategy with execution, a crucial advantage in

today's volatile environment, leading to strategy being shaped and refined through its implementation (Li, 2020).

The Project Management Institute (PMI) found that around 70% of surveyed organizations were engaged in digitalization projects by 2020 (Badewi, 2022). Uchihira and Eimura (2022) interpret this as an indication of an increasing trend to start such projects in the rapidly evolving business landscape. For many organizations, the choice to undertake digitalization projects has shifted from "*why*" to "*when"* and *"how."*

Despite the diversity of projects in technology, size, complexity, and risk, traditional project management literature often generalizes them (Shenhar et al., 2001). Organizations should recognize that digitalization projects are central to the transformation journey, not mere add-ons (Henke et al., 2016). Table 2-4 provides several definitions of digitalization projects as adopted in research. While various terms exist for these projects, this research opts to use *'digitalization projects'* as the preferred term.

From Table 2-4 below it can be observed that there is no single agreed-upon definition. However, there appears to be a consensus among authors that digitalization projects are strategic initiatives leveraging digital technologies to drive organizational transformation.

Table 2-4: Digitalization projects as defined in literature

Reference	Terminology used	Definition
(Sept, 2020)	Digitalization projects	Digitalization projects are digitally supported social innovation initiatives
(Sanchez-Segura et al., 2021)	Digitalization projects	Projects to be developed in the process of the digital transformation

(Henriette et al., 2015)	Digital transformation projects	Projects involving the implementation of digital capabilities to support business model transformations
(Grahn et al., 2020)	Digitalization projects	Projects involving software or programmable instructions (e.g., automation projects, projects involving introductions of digital tools)
(Gertzen et al., 2022)	Digital transformation projects	Projects that use new technologies to radically change the ways of working in an organization in order to improve efficiency, reduce waste, manage data and information better, support better decision-making, and implement the DT of a business.
(Hassani et al., 2018)	Digital projects	Digital Projects are projects done in the digital domain, sometimes centered specifically in digital media space.
(Baier et al., 2022)	Process digitalization projects	Projects that leverage DTs for improving business processes in terms of effectiveness and efficiency as process digitalization projects (PDPs).

2.5.2 Are digitalization projects different?

Researchers have made efforts to enhance the success of digitalization projects by deepening their understanding and differentiating them from traditional IT projects. Research indicates that digitalization projects differ significantly from traditional IT projects, necessitating their own project management methods due to the digital era's creation of new organizational structures, systems, processes, leadership styles, management approaches, and social goals (Barthel & Hess, 2020; Gertzen et al., 2022; Hassani et al., 2018; Jensen, 2021; Vial, 2019). Unlike IT projects that support existing strategies and identities, digitalization projects seek to redefine a company's value proposition and drive new business strategies, with uncertainties

arising both internally and externally, the latter being more dominant in digital transformations (Gertzen et al., 2022; Vial, 2019).

Barthel and Hess (2020) identified five distinct characteristics of digitalization projects compared to IT projects: (i) they support the digital transformation strategy, (ii) their impacts often exceed initial plans, (iii) they are heavily centered on various forms of digital innovation, (iv) they merge technology with business perspectives, and (v) they employ innovative project methods. Barthel and Hess (2020) also argue that digitalization projects should be viewed as a blend of IT, innovation, and organizational change endeavors.

The digital transformation process starts with digitizing information, then digitalizing business operations and roles, and ultimately transforming the business strategy (Bloomberg, 2018). Literature generally agrees that the incremental stages of digitization and digitalization are prerequisites for the comprehensive phase of digital transformation (Parviainen et al., 2017). These projects are steps toward digital transformation, requiring organizational flexibility to adapt as they progress from digitization to digitalization and finally to digital transformation (Barthel & Hess, 2020; Henriette et al., 2015; Sanchez-Segura et al., 2021; Verhoef et al., 2021). Studies confirm that both digitization and digitalization are pathways to digital transformation (Abdallah et al., 2021; Kutzner et al., 2018; Zangiacomi et al., 2020).

2.5.3 Digitalization projects' challenges and status quo

The World Economic Forum's 'Digital Transformation Initiative' (DTI), launched in 2015, provides insights into the impact of digital technologies on business and society for the next decade (WEF, 2018). Analyzing data from 2017-2018, the DTI highlights digitalization's potential to generate approximately $100 trillion in value for society and business over ten years (WEF, 2018).Thus, executing effective digitalization projects has become a critical industrial and economic goal (Grahn et al., 2021).

For effective management, grasping the potential value of digitalization projects is essential before their execution (Gertzen et al., 2022). Success depends on a consensus among staff and project members on the "desirable" value. However, many companies launch these projects without a full understanding of their benefits, a gap in understanding that ultimately results in unsuccessful outcomes (Grahn et al., 2021).

Digitalization projects often have a high failure rate; most fail even before full implementation (Mielli & Bulanda, 2019). Supporting this, Li (2020) notes that despite extensive research and practice, organizations struggle with DT initiatives. Reeves et al. (2018) report that over 70% of DT projects fail, a finding echoed by Sanchez-Segura et al. (2021), highlighting project failure as a significant concern in the digital transformation context.

Research presents several reasons that can result in negative outcomes of digitalization initiatives. Bencsik (2020) identified issues management face in the digital economy and found that in theory, managers acknowledge the critical situations they face, but they do not engage in essential preparatory actions. including not dealing with the tasks that would mean re-evaluating their managerial activities, primarily in terms of soft categories. On the other hand, (Gulati & Reaiche, 2020) identified aspects of digital transformation which hinder the successful implementation and change management in organizations.

Key factors leading to failure in digital transformation initiatives is the human factor and the absence of a clear strategy (Topić, 2023). Employees may view digital changes as job threats and resist accordingly, therefore having inclusive and consultative processes that encourage upskilling can facilitate smoother transitions (Topić, 2023).

Large enterprises face five primary challenges in digitalization projects: resistance to change, unclear digital customer journey vision, poor data management,

inflexible technology and processes, and difficulty transitioning from IT to digital platforms (Tiersky, 2017). Tiersky (2017) recommends overcoming these issues by leveraging expert project management and learning from past project experiences.

Davenport and Westerman (2018) argue that digital innovation failures often stem from treating it as a universal remedy while overlooking other critical factors such as economic viability and product desirability. They further point out that digital transformation should be seen as a continuous process that integrates people, machines, and business processes, requiring ongoing oversight.

Correani et al. (2020) identify the neglect of change management regarding employees and customers who must alter their interactions with project outputs, as another factor hindering digitalization project success. Mielli and Bulanda (2019) cite factors such as poor partnerships, skill gaps, departmental silos, undefined business cases, and a focus on technology over problems as barriers to digitalization success. Unmanaged change can lead to chaos, causing delays and cost overruns (Jun et al., 2011), nevertheless despite the high uncertainty and risk, decision-makers are pressured to act quickly (Li, 2020).

2.5.4 Overcoming challenges in the implementation of digitalization projects

Digitalization requires thorough exploration and understanding, with decisions often influenced by market hype and a few success stories (Davenport & Westerman, 2018). Effective digital transformation necessitates deliberate and strategic planning (Mielli & Bulanda, 2019). The ability to adapt and embed new knowledge into routines is critical for project success (Dultra-de-Lima & Brito, 2022), emphasizing the need for intentional planning.

Unambiguous, enthusiastic, and continuous leadership support is crucial for the success of any digitalization project; without bold leadership, initiating such initiatives is ineffective. Leaders typically require a solid business case before

committing to significant initiatives (Correani et al., 2020). Additionally, Andriole (2020) places leadership support and corporate culture above other factors in executing digital projects, emphasizing that organizations must not overlook either.

Research suggests that digitalization projects necessitate the creation of a Chief Digital Officer (CDO) role (Singh & Hess, 2017), demand new capabilities and organizational structures (Henriette et al., 2015), and require teams with diverse competencies (Correani et al., 2020; Tumbas et al., 2018). These shifts in organizational structure, culture, processes, and workflows (Larjovuori et al., 2016) add to the complexity and challenge of managing digitalization projects (Hafseld et al., 2021).

Overlooking the 'soft factor' such as corporate culture and employee mindset can significantly impede project success (Andriole, 2020). Experts concur that for smooth digital transformation initiatives, executives must consider and communicate corporate values to employees before beginning the process (Verina & Titko, 2019).

2.6 Emerging topic within the thesis focus

2.6.1 Learning within the digital transformation context

In "The Digital Transformation Playbook," Rogers (2016) highlights that the initial challenge for organizations transitioning to data-centric operations is recruiting individuals with the necessary skills. Digital technologies are revolutionizing every facet of business management, altering how companies interact with customers, competitors, data, innovation, and value (See (Table 2-5)). Rogers (2016) advocates for a comprehensive strategy i.e., a holistic approach over a fragmented one in adapting to these changes.

Table 2-5: Domains and strategic themes of DT, adapted from (Rogers, 2016, p. 9)

Domain	Strategic themes
Customers	Organizations should harness customer networks including understanding customer behaviors and re-inventing the marketing approach.
Competition	Organizations should focus on building platforms, not just products. Through establishing partnerships. Organizations need to learn where and when to cooperate with competitors.
Data	Organizations should learn how to turn data into assets including the right people, right skills and right culture and risks around data security and privacy
Innovation	Organizations should innovate through rapid experimentation – i.e., encouraging smart failures
Value	Organizations should learn how to continuously adapt their value proposition

According to Rogers (2016), in the context of digital transformation, data serves as a crucial asset that enables ongoing experimentation, learning, and idea validation. Beyond improving products, data helps to refine processes and facilitate more relevant customer engagements, ultimately transforming how organizations learn and innovate. Table 2-6 shows how strategic assumptions regarding innovation are changing as the world moves from analog to digital age.

Digital technologies enable more frequent and essential experimentation, offering novel tools for innovation and requiring companies to innovate quickly to keep pace with a rapidly changing environment (Rogers, 2016, p. 133). This results in a unique approach to learning that is grounded in constant experimentation (Rogers, 2016, p. 122).

Table 2-6: Changes in strategic assumptions from analog to digital age, adapted and modified from (Rogers, 2016, p. 125)

Change aspect	Analog age (From)	Digital age (To)
Decision making	Based on intuition and seniority	Based on testing and validating
Testing ideas	Expensive, slow, and difficult	Cheap, easy, and fast
Experiments frequency	Conducted frequently, by experts	Conducted constantly, by everyone
Challenge	Finding the right solution	Solving the right problem
Ideas on failure	Avoided at all costs	Learning from failure early, and cheaply
Focus	On the finished product	On minimum viable prototype and iteration after launch

Rogers (2016) differentiates between convergent and divergent experimentation in digital transformation context. Convergent experimentation is ideal for situations requiring a specific answer to a defined question, effectively narrowing down options. In contrast, divergent experimentation is suited for exploring various options, generating insights, and raising new questions for subsequent iterative stages. Both types expand knowledge, challenge assumptions, seek external insights, and demand a willingness to learn rather than merely plan and decide, though their approaches differ significantly (Rogers, 2016, p. 129). The concept of leveraging external knowledge for organizational benefit is termed as *absorptive capacity.*

2.6.2 Absorptive capacity

Absorptive capacity (ACAP) is recognized as a crucial driver of competitive advantage, involving organizational routines that identify and utilize external knowledge (Lane et al., 2006; Yildiz et al., 2019) (Liao et al., 2003). Cohen and Levinthal (1990) initially defined ACAP as *"the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends"*. Zahra and George (2002) later refined the concept by distinguishing between potential ACAP (knowledge acquisition and assimilation) and realized ACAP (knowledge transformation and exploitation), suggesting that potential ACAP allows for strategic flexibility and adaptability in dynamic environments, while realized ACAP helps sustain competitive advantage in such settings.

Acquisition capacity is a firm's ability to locate, identify, value, and acquire external knowledge essential for its operations (Liao et al., 2003) Zahra and George (2002). Assimilation capacity is the firm's ability to analyze, process, and internalize new information or knowledge (Szulanski, 1996; Zahra & George, 2002). Transformation capacity is the firm's capability to modify and enhance routines that merge existing knowledge with new insights (Zahra & George, 2002), which can involve updating or reinterpreting knowledge in innovative ways (Camisón & Forés, 2010). Exploitation refers to the organizational capacity to incorporate acquired, assimilated, and transformed knowledge into their operations and routines not only to refine, perfect, expand and leverage existing routines, processes, competences, and knowledge, but also to create new operations, competences, routines, goods and organizational forms (Camisón & Forés, 2010; Zahra & George, 2002).

While ACAP has two components; realized and potential, knowledge undergoes several iterations before its value is fully harnessed by an organization. Therefore, fostering both realized (RACAP) and potential (PACAP) absorptive capacities is essential for streamlining this process (Camisón & Forés, 2010).

Organizations embarking on digitalization projects as part of their business strategies aim to enhance performance and secure a competitive edge. These projects prompt the acquisition, exchange, application, and transfer of knowledge, fostering innovation. As innovation becomes routine, knowledge proliferates among individuals, spreads to various projects, and permeates the organization. Recognizing that knowledge resides within individuals, it is crucial for organizations to discern how to maximize and distribute this knowledge effectively across projects to fully capitalize on their collective intellectual assets.

In today's business landscape, organizations are persistently pursuing digital transformation, which has shifted from being an innovative trend to a standard practice. Digital transformation offers a competitive edge, cost reduction, risk mitigation, and performance enhancement. Achieving this transformation is an ongoing journey, marked by a series of digitalization initiatives and projects that demand organizational agility and new management approaches. Employees are required to adapt, acquiring new skills and competencies. The unique nature of each digitalization project presents a knowledge management challenge. Moreover, the rapid evolution of digital technologies complicates the task of discerning which knowledge will retain its value and relevance in the future.

2.7 Research gap

The theoretical foundation outlined in the initial section of this chapter reveals that research on digitalization projects is still emerging. The considerable failure rates of such projects have drawn researchers' attention, aiming to uncover ways to facilitate successful outcomes. Additionally, the domain of project management has not fully integrated digitalization projects as a project domain, indicating an opportunity for project management scholars to make significant contributions to this area.

While the field of organizational learning has been extensively studied, research specifically addressing digital transformation, and even more so digitalization projects, remains limited. Given that digital transformation represents a critical path forward for organizations, and is realized through a series of digitalization projects, it is vital to capture and leverage the value from each project. Sharing knowledge within and across projects can save time and costs by reducing process duplication, preventing the repetition of past errors, and fostering innovation - a key component of digitalization. This thesis bridges the research domains of organizational learning with digital transformation and project management to offer new perspectives.

The literature acknowledges technology as a fundamental component of digital transformation, yet researchers agree that the human aspect is even more critical (Bajer, 2017; Del Rowe, 2017; Kohnke, 2017; Kraus et al., 2021; Lichtenthaler, 2020). Despite the agreement on the importance of the human element, there remains a lack of comprehensive research dedicated to it (Andriole, 2018).

Research on digital transformation has extensively explored soft factors from various perspectives. For instance, the emergence of new leadership roles like chief digital officers and chief transformation officers has been discussed (Haffke et al., 2016; Horlacher & Hess, 2016; Singh & Hess, 2017; Tumbas et al., 2018). The need for a corporate culture conducive to transformation and active employee engagement to reduce resistance to change has also been emphasized (Abollado et al., 2017; Hartl & Hess, 2017; Weston, 2017; Wolf et al., 2018). Nevertheless, a significant gap often exists between what executives say about digital transformation and their actual actions, leading to a strategy-execution gap (Andriole, 2018). It would benefit practitioners to access insights that address soft factors comprehensively. Additionally, enriching the project management literature with discussions on soft factors, separate from the focus on digital technologies, would be beneficial.

Nwaiwu (2018) critically examined existing frameworks of digital business transformation and determined that well-established models like the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), along with their variants, fall short in capturing the complexities of digitalization and digital transformation. This gap underscores the necessity for alternative frameworks that could provide a more comprehensive understanding of digitalization initiatives (Nwaiwu, 2018). Additionally, (Baier et al., 2022) point out the absence of clear guidance for the successful implementation of digitalization projects.

Despite researchers' efforts to broaden understanding of digitalization projects, the topic still lacks focused attention in project management research, which is necessary for a deeper understanding and to improve success rates. This shortfall is reflected in the few research articles specifically dedicated to digitalization projects in project management journals. Kozak-Holland and Procter (2019) have noted a scarcity of literature on project management in the context of digital transformation within academic journals like Project Management Journal (PMJ) and the International Journal of Project Management (IJPM). They observe that while conferences such as those organized by the Project Management Institute (PMI) have shown more interest, it is surprising that PMJ and IJPM have not yet picked up on the topic (Kozak-Holland & Procter, 2019).

In January 2023, a search was performed in Scopus for the terms "*digital transformation project*" and "*digitalization project"/"digitalisation project*" which resulted in a maximum of three hits for 10 project management journals listed on Scimago Journal & Country Rank (SJR). The term *"digital transformation"* appeared to dominate, with a total of 96 hits for all 10 journals together, each of which had at least 1 hit (as seen on Figure 2-2). On the contrary, a search conducted for the same time span for conferences resulted in 5,907 hits for the term *"digital transformation*

project," 76 for "*digital transformation project,"* and 75 for *"digitalization projects,"* indicating an overall increase in interest among researchers.

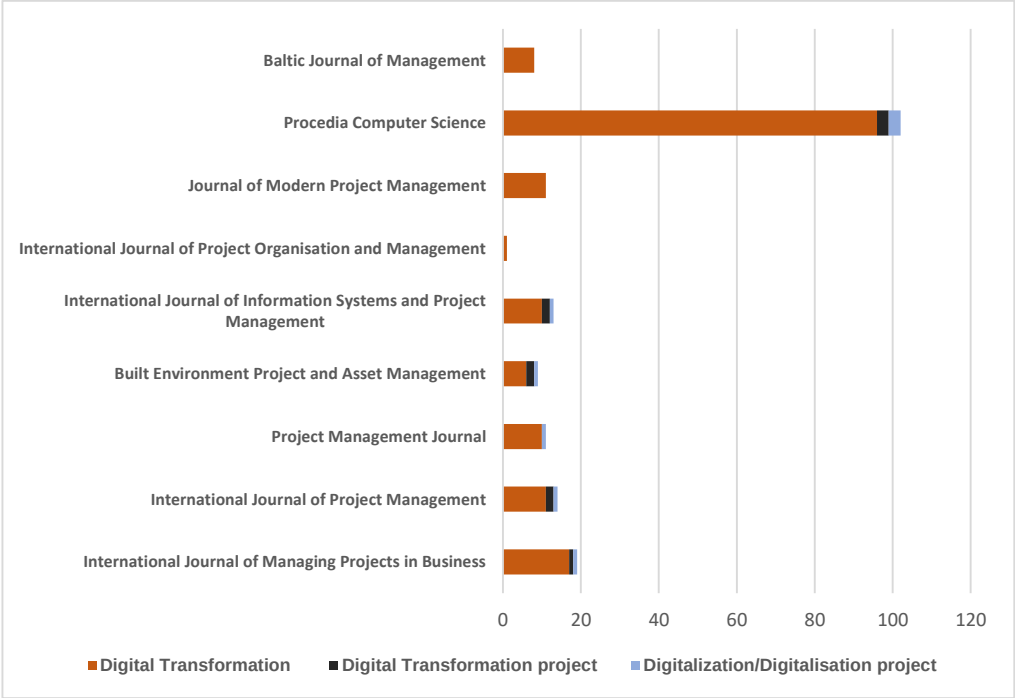

Figure 2-2: Search results in project management

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3 Methodology chapter

3.1 Rationale for the research

Three research questions were developed for further investigation. These are presented below:

RQ1: What are the challenges that organizations face in implementing digitalization projects?

RQ2: How do different soft factors rank in terms of their influence on the successful implementation of digitalization projects

RQ3: What strategies and approaches have proven most effective in overcoming challenges related to the implementation of the highest ranking soft factor in digitalization projects?

The research journey, often depicted linearly, is in reality more cyclical, adapting as new findings emerge (Mackenzie & Knipe, 2006). This research was iterative, with changes integrated as dictated by ongoing findings. Some adjustments were made at specific stages, not foreseeable at the outset. The investigation unfolded in three research questions **(RQ1, RQ2, and RQ3)** which steered the direction of the research and contributed to a deeper understanding of digitalization projects.

The research commenced with an exploration of soft factors in digitalization project implementation where challenges are identified (RQ1). Insights from RQ1 informed the investigation into exploring how soft factors rank in terms of their influence in digitalization project success (RQ2). The study concluded by identifying challenges facing organizations in implementing the highest ranking soft factor and strategies organizations can employ to overcome those challenges (RQ3).

The thesis research followed a dual funnel approach, starting broadly with an exploratory phase on soft factors in digitalization projects, funneling down by the use of existing knowledge and empirical data. This initial phase produced **Papers A**

and B. The second phase narrowed the focus, filtering through knowledge until a pivotal soft factor emerged, leading to **Paper C**. This phase is referred to as 'turning point'. The final phase focuses on this factor for in-depth analysis, resulting in enriched insights and Papers **D, E, and F**. The dual funnel approach used to describe the thesis research design aligns with Saunders et al. (2019), who note that exploratory research typically begins wide and narrows over time. The contribution of each paper to the research questions is detailed in Table 3-1.

Table 3-1: Contribution of each paper in addressing the research questions

Research questions	Paper A	Paper B	Paper C	Paper D	Paper E	Paper F
RQ1	✓	✓	✓			
RQ2			✓			✓
RQ3			✓	✓	✓	✓

3.2 The research onion

Using the metaphor of peeling an onion, Saunders et al. (2019) presents six layers that help researchers to make decisions regarding their research methodology. Following the research onion metaphor, researchers peel each layer (from the outermost layer inwards) beginning from defining their philosophical stance and progressing inwards through subsequent layers, concluding with data collection and analysis (Saunders et al., 2019). The research study presented in this thesis applies the research onion framework as shown in Figure 3-1, hence the layers of the research onion will be addressed for the publications included in the thesis.

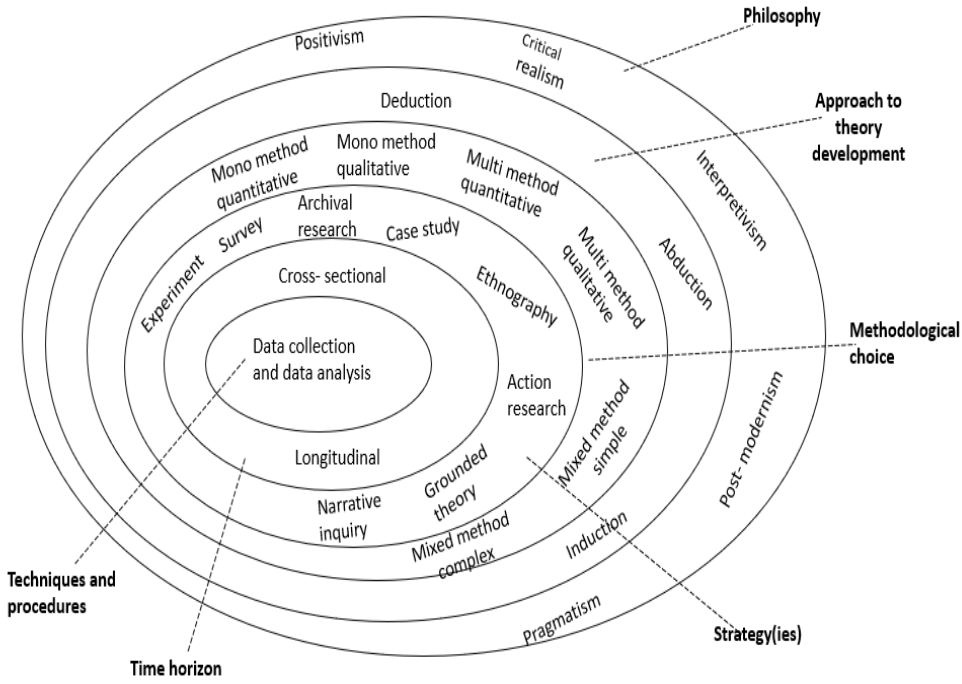

Figure 3-1: Research onion, redrawn from ((Saunders et al., 2019), p 130

3.3 Philosophical Position

The development of knowledge can include different aspects including either new theory development or addressing specific issues in organizations (Saunders et al., 2019). In developing such knowledge, researchers usually refer to a system of beliefs and assumptions called research philosophy (Saunders et al., 2019). Philosophy is a fundamental constitutive part of ourselves, in this context the researcher, in their life and work (Konstantinou & Müller, 2016).

A chosen research philosophy or paradigm plays a crucial role in determining the way the research is conducted. All researchers make several assumptions during the

research which can be epistemological, ontological, or epistemological (Saunders et al., 2019).

Ontology are philosophical assumptions that the researcher makes about the nature of reality (Easterby-Smith et al., 2021; Saunders et al., 2019). Epistemology is the study of the nature of knowledge and ways of enquiring it into the physical world and social world (Easterby-Smith et al., 2021), which (Saunders et al., 2019) refers to as assumptions about human knowledge. The term 'axiology' originates from two Greek roots, axios and logos; axios bearing the meaning of '*worth'* or '*value*' and logos the meaning of '*logic'* or *'theory'*, combined, we have the notion of 'a theory of value' (Biedenbach & Jacobsson, 2016). Axiological assumptions are based on the extent to which the values of the researcher influence their research process (Saunders et al., 2019).

Epistemological, ontological, and axiological assumptions critically shape the research process, affecting the selection of methods, strategies, and techniques for data collection and analysis, and thereby influencing the outcomes (Bryman, 2016; Saunders et al., 2019). It is crucial for researchers to establish their philosophical stance early on, as it lays the foundation for their assumptions and beliefs, ensuring coherence and alignment throughout the research journey (Saunders et al., 2019).

Saunders et al. (2019) explain that research philosophies reflect researchers' political or ideological orientation towards the social world they are studying. They outline an ideological dimension with two opposing views: objectivism and subjectivism. Objectivism posits that social reality exists independently of individuals, while subjectivism contends that social reality is constructed through individual perceptions and actions (Saunders et al., 2019). Table 3-2 shows the different philosophical assumptions based on the two extremes of objectivism and subjectivism.

Table 3-2: Assumptions of objectivism and subjectivism

Assumption	Nature of question	Objectivism	Subjectivism
Ontology	• What is the nature of reality? • What is the world like?	• Real • External • One true reality (universalism) • Granular (things) • Order	• Nominal/decided by convention • Socially constructed • Multiple realities (relativism) • Flowing (processes) • Chaos
Epistemology	• How can we know what we know? • What is considered acceptable knowledge? • What constitutes acceptable data? • What kinds of contribution to knowledge can be made?	• Adopt assumptions of the natural scientist • Facts • Numbers • Observable phenomena • Law-like generalizations	• Adopt assumptions of the arts and humanities • Opinions • Written, spoken and visual counts • Attributed meanings • Individual and context specifics
Axiology	• What is the role of values in research? • How should we deal with the values of research participants?	• Value-free • Detachment	• Value-bound • Integral and reflexive

Burrell and Morgan (1979) categorized research perspectives into two extremes: regulation and radical change. Regulation-focused researchers aim to understand and support the existing order of societies and organizational behavior, often seeking to improve within the current system rather than challenging it fundamentally. This approach is common in business and management research, which typically looks for ways to optimize within the status quo. In contrast, radical change-oriented researchers aim to fundamentally transform or overturn existing structures and practices, exploring new possibilities and alternatives to the current

state. Combining the subjectivist-objectivist dimension with these perspectives of regulation and radical change yields four distinct paradigms for understanding organizational and social worlds (illustrated in Figure 3-2).

Radical change

Radical humanist ● Concerned with changing the status quo ● Approaches concerns from within a subjectivist ontology	**Radical structuralist** ● Concern is to approach the research with a view to achieving fundamental change ● Adopts an objectivist perspective due to the concern with objective entities. ● Is often underpinned by a critical realist philosophy
Interpretive ● Concerned with the way humans attempt to make sense of the world around them. ● Focuses on discovering multiple subjectivities ● The concern is to become involved in the organization's everyday activities in order to understand and explain what is going on, rather than change things	**Functionalist** ● Most business and management research operate in this paradigm ● Theories and models are often generalized to other contexts ● Research is most likely to be underpinned by the positivist research philosophy (positivist-functionalist)

Subjectivist ***Objectivist***

Regulation

Figure 3-2: Four paradigms of organizational analysis and their respective assumptions, adapted from (Saunders et al., 2019)

3.3.1 Philosophical stance of project management

Ontological assumptions within the field of project management pertain to the beliefs authors hold about the nature of project reality. (Gauthier & Ika, 2012). Consequently, project and project management research risks being compromised if the importance of ontology is underestimated (Gauthier & Ika, 2012). Recognizing this, it has been proposed that consideration of the ontological level, along with theoretical and epistemological levels, is essential and serves as a foundational prerequisite for conducting pertinent research in project management (Bredillet, 2010).

The world and the world of projects are changing at an unprecedented rate (Konstantinou & Müller, 2016). Issues like such as terrorism, cybercrime, power change between nations, governments, citizens, religions, technological advancement (i.e., digital transformation) and other issues, are all interdisciplinary, time-sensitive and reflect the context within which projects are inspired, designed, executed, and delivered (Konstantinou & Müller, 2016). Due to the interdisciplinarity, diversity, time sensitivity of projects, has led to criticism around the theoretical base of project management as being too narrow or insufficient to cover varying contexts (Konstantinou & Müller, 2016). For complex pluralistic or conflicting settings, standards aiming at universality encounter limitations (Bredillet et al., 2015).

Konstantinou and Müller (2016) advocate for a philosophical shift in project management. As the nature of projects evolves, they challenge the traditional view of projects as unique, one-time endeavors and suggest a process-oriented approach. Projects are increasingly seen as parts of larger systems with specific roles and defined interfaces, rather than isolated efforts to deliver products or services. Therefore, Konstantinou and Müller (2016) argue that the conventional belief that project success can be secured through processes, tools, and techniques is too

narrow a philosophy. They recommend adjusting the ontology of projects to acknowledge their complexity and the sociological and human factors at play.

Debates persist over the most suitable philosophy for project management without a clear consensus (Saunders et al., 2019), leading to diverse philosophical stances in research. Konstantinou and Müller (2016) advocate for a range of philosophies to reflect the multifaceted nature of projects. They contend that philosophy should be transformative and forward-looking, serving as a means to refine our thinking and provide direction for the future. Thus, they suggest the true value of philosophy in practice lies in fostering and examining a variety of philosophical approaches rather than seeking a single universal one.

Ika and Bredillet (2016) advocate for a broad understanding of project management by valuing diversity and the breadth of insights it offers. Rather than adhering to a single philosophical stance, they propose a spectrum of philosophical underpinnings. They liken this approach to viewing the entire forest for a more comprehensive perspective, rather than focusing narrowly on a single tree. By considering various options and alternatives, practitioners have a better opportunity to evaluate actions, decide on procedures, and understand the range of available choices (Konstantinou & Müller, 2016).

Notwithstanding, the discipline of business and management was founded through absorption of philosophies from natural sciences, social sciences and arts and humanities (Saunders et al., 2019). This implies that business and management research philosophies are scattered along a multidimensional set of continua (Niglas 2010) between two opposing extremes (Saunders et al., 2019).

3.3.2 Research paradigm adopted for this research

As a novel researcher, recognizing the differences and disagreements between various philosophies enriches my justification for the philosophical stance underpinning my chosen research methods (Saunders et al., 2019). Philosophies

underpin our thought processes, encompassing our social and individual lives, innovation, and the measures and steps we take to address the challenges we encounter, both together and on our own (Konstantinou & Müller, 2016). Philosophies should aid in comprehending projects without causing discomfort; it is our role to interpret projects, not the other way around (Konstantinou & Müller, 2016). This perspective encourages the development of new philosophies that address current challenges, explore alternative interpretations of the unknown, and foster professional growth, making us accountable and integral to our practice (Konstantinou & Müller, 2016).

Embracing various philosophies can refine our thinking, hone our instincts, inform our intentions, and allow us to pursue diverse objectives in our professional practice. These philosophies become tools to confront challenges, navigate the unknown, and deepen our engagement with our work (Konstantinou & Müller, 2016). As a new researcher in project management, my grasp of these philosophies is still developing, and the field's complex terminology has not simplified matters. The interchangeable use of 'paradigms' and 'philosophies' in management research introduces additional complexity (Saunders et al., 2019). Moreover, the boundaries between philosophy, paradigm, and methodology are often so blurred that one can find themselves crossing these boundaries, particularly for those new to the concepts and trying to understand their application in research (Saunders et al., 2019).

Thus, despite my restricted knowledge on the topic, I attempted to find my philosophical stance, a task that proved challenging. I believe my philosophical position leans between pragmatism and interpretivism. To further clarify my stance, I used the HARP test suggested by (Saunders et al., 2019)) which confirmed my belief, indicating pragmatism and interpretivism as my predominant philosophies, as shown in Table 3-3.

Table 3-3: The HARP score

	HARP score
Positivism	1
Critical Realism	14
Interpretivism	18
Postmodernism	14
Pragmatism	16

In business and management research, no single philosophy can be deemed the best fit, as each offers a unique and valuable perspective on the organizational world (Saunders et al., 2019). Emphasizing the importance of diversity, variety, and the depth of insights, Ika and Bredillet (2016) opt not to restrict oneself to a singular philosophical stance but rather to lie over a range of philosophical underpinnings.

The idea of combining different paradigms, although debated, is not new. On one hand, studies show that paradigms are distinct and cannot overlap (Easterby-Smith et al., 2021). On the other hand, studies suggest that paradigms are more flexible than previously portrayed (Cunliffe, 2011). And an in-between argument shows that paradigms can be combined to a certain extent. Easterby-Smith et al. (2021) argues that one can combine adjacent ontologies and epistemologies within a mixed method study, but it can be challenging to combine very distant positions. If ontologies are adjacent, it will lead to coherent understanding, otherwise it might lead to confusion.

Goldkuhl (2012) analyzed the possibility of combining two philosophies (pragmatism and interpretivism) and found this to be justifiable. The decision on whether to or not to combine paradigms depends on the researcher's assumptions and their position on the objectivism-subjectivism continuum (Saunders et al., 2019). Generally, pragmatists seek to overcome dichotomies of objectivism-subjectivism in research, and are therefore likely to engage in multi-paradigmatic research

(Saunders et al., 2019). This would explain why my assumptions being multi-paradigmatic, comprises assumptions of both a pragmatist and an interpretivist.

Different perspectives give value to research as they enable us to consider contexts involving plurality or conflicting views amongst stakeholder and complex and uncertain situations (Bredillet et al., 2015). When searching for answers in a pluralistic setting, we should not allow a universal way of thinking to limit our understanding of realities (Bredillet et al., 2015). Research advocates for such diversity, emphasizing that each way of thinking contributes something unique and valuable, enabling a different way of perceiving realities (Morgan, 2007).

Project stakeholders with their diverse expectations, shape project reality through their individual and collective actions (Ika & Bredillet, 2016). Regardless of the metaphysical position practitioners choose, they cannot avoid encountering perspectives from the other end of the spectrum. Ika and Bredillet (2016) propose that as a project moves through the life cycle, it can appear differently thus may require different approaches i.e., embracing 'a process and becoming' view during the project front-end, where the future is invented, and then shifting to 'a thing and being' view during the project execution. They emphasize the importance of acknowledging that what matters is the relative importance rather than an "either/ or" alternative (Ika & Bredillet, 2016).

3.3.2.1 Pragmatism

Pragmatism is a philosophical stance advocating for theory development directly from practice (praxis), emphasizing an iterative process of deriving theory from actions and applying it back to practice (Christ, 2013). Pragmatic researchers focus on the problem at hand, allowing for the utilization of all possible means to address it (Creswell & Creswell, 2018). By centering the research question, they choose data collection and analysis methods that are most likely to offer insights into the question, without adhering strictly to any particular paradigm (Mackenzie & Knipe, 2006). Consequently, depending on the nature of the problem, a pragmatic

approach can oscillate between objectivist and subjectivist positions (Saunders et al., 2019).

The pragmatic paradigm offers the flexibility to employ multiple methods, embrace various worldviews and assumptions, and utilize different forms of data collection and analysis (Creswell, 2003, p.12) (Mackenzie & Knipe, 2006). Given the inherent nature of humans, a mixed-methods approach enhances the credibility and trustworthiness of conclusions by mitigating everyday limitations in problem-solving (Tashakkori & Teddlie, 2010).

Pragmatists prioritize understanding the 'what' and 'how' aspects of research problems (Creswell & Creswell, 2018). They position "the research problem" at the core and utilize all available approaches to comprehend the issue (Creswell & Creswell, 2018). This focus on problem-solving makes the pragmatic paradigm particularly relevant in project management research, where emphasis is often placed on processes crucial to studies of knowledge and learning (Easterby-Smith et al., 2021).

3.3.2.2 Interpretivism

Interpretivism points out the difference between humans and physical phenomena through the emphasis that humans generate meanings (Saunders et al., 2019).. Interpretivism argues that the study of human beings and their social worlds cannot be approached in the same manner as the study of physical phenomena (Saunders et al., 2019). Therefore, Saunders et al. (2019) advocate that research in social sciences should differ from that in natural sciences, rather than attempting to emulate it. Interpretivist research aims to generate new and richer understandings and interpretations of social worlds and contexts. For business and management researchers, this involves viewing organizations through the diverse perspectives of different groups of people (Saunders et al., 2019).

The interpretivist/constructivist researcher primarily focuses on the participants' perspectives in the studied situation and recognizes how their own background and experiences influence the research (Creswell & Creswell, 2018). Constructivists do not generally begin with a theory but inductively develop a theory or pattern of meanings as the research progresses (Creswell & Creswell, 2018). The constructivist researcher often rely on qualitative data collection methods and analysis (Creswell & Creswell, 2018), however a combination of both qualitative and quantitative methods (mixed methods) can be used (Mackenzie & Knipe, 2006). Quantitative data in this context is utilized to complement or enhance the qualitative data, thereby enriching the overall description and understanding of the research topic (Mackenzie & Knipe, 2006).

The interpretivist perspective has been argued to be highly appropriate for business and management research (Saunders et al., 2019). This suitability is underpinned by the inherent complexity and uniqueness of business situations. The interpretivist perspective highlights a specific situation of interactions and circumstances among individuals gathering at a particular time (Saunders et al., 2019). A key challenge for interpretivists lies in immersing themselves in the social world of their research participants and understanding it from their perspectives (Saunders et al., 2019). For a concise overview of the underlying assumptions of both interpretivism and pragmatism, refer to Table 3-4.

Considering digitalization projects within a pluralistic setting, and acknowledging their low success rates, becomes advantageous to adopt not merely a single, universal paradigm but rather a pluralistic perspective. This approach recognizes the dynamic nature of such projects within evolving environments, acknowledging their wide-reaching implications across various organizational boundaries and among groups with differing needs, views, and expectations. Given the infancy stage of digitalization projects as a research topic (Baier et al., 2022), a broader perspective that aligns more closely with practical realities is beneficial. This may necessitate the

triangulation of different philosophical approaches to fully grasp the complexity of the subject (Bredillet et al., 2015).

Table 3-4: Assumptions of interpretivism and pragmatism paradigms

	Interpretivism	**Pragmatism**
Ontology	• Complex and rich • Socially constructed through culture and language • Multiple meanings, interpretations, realities • Flux of processes, experiences, practices	• Complex, rich and external • 'Reality' is the practical consequences of ideas • Flux of processes, experiences, and practices
Epistemology	• Theories and concepts too simplistic • Focus on narratives, stories, perceptions and interpretations • New understandings and worldviews as contribution	• Practical meaning of knowledge in specific contexts • 'True' theories and knowledge are those that enable successful action • Focus on problems, practices, and relevance • Problem solving and informed future practice as contribution
Axiology	• Value-bound research • Researchers are part of what is researched, subjective • Researcher interpretations key to contribution • Researcher reflexive	• Value-driven research • Research initiated and sustained by researcher's doubts and beliefs • Researcher reflexive

Method	• Typically inductive • Small samples • In-depth investigations • Qualitative methods	• Follows the research problem and question • Range of methods; mixed, multiple, qualitative, quantitative, action research • Emphasis on practical solutions and outcomes

3.3.3 Theory Development

This thesis embraces both deductive and inductive approaches for theory development, embodying an overall abductive research approach. This involves moving back and forth between the two throughout the research process, as evidenced in the papers that inform this study. As (Mackenzie & Knipe, 2006) highlight, research projects typically do not progress in a neat, linear fashion; rather, they often involve a cyclical process of moving back and forth through different steps. It is important to recognize that no single approach is superior to the others, as each has its strengths in different contexts (Saunders et al., 2019).

Saunders et al. (2019) describe the deductive approach as one where the theory is derived from data, particularly relevant in research areas that are not extensively explored and lack a well-established body of knowledge. Conversely, Saunders et al. (2019) describe the inductive approach as one involving the development of a theory followed by its rigorous testing through a series of propositions. In this approach, the starting point typically involves a well-established, pre-existing body of research. The abductive approach, on the other hand, starts with the observation of a 'surprising fact' and then develops a plausible theory to explain how this fact came to be.

Table 3-5 provides the descriptions of the three research approaches - deductive, inductive, and abductive as described in (Saunders et al., 2019). The table highlights different aspects of each approach including the underlying logic, the process of

generalization, the application of collected data, and methodology of theory development.

Saunders et al. (2019) suggest that a researcher's philosophical underpinnings significantly influence their approach to theory development. For instance, if a researcher's philosophical stance is dominated by interpretivism, then induction will be the likely approach to theory development. Conversely, researchers with a positivist orientation tend to favor deduction for theory development. Postmodernists, pragmatists, and critical realists, who often oscillate between deductive and inductive reasoning, are more inclined to favor abduction as their primary approach for developing theories (Saunders et al., 2019).

Table 3-5: Approaches to theory development and their differences, adapted and modified from (Saunders et al., 2019)

	Deduction	**Induction**	**Abduction**
Logic	When the premises are true, the conclusion must also be true	Known premises are used to generate untested conclusions	Premises are used to generate testable conclusions
Generalizability	From the general to the specific	From the specific to general	From the interactions between the specific and the general
Data usage	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data

			collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory
Most likely dominating philosophy	Positivism	Interpretivism	Pragmatism, critical realism, and postmodernism

Papers A, B, C, D and E take an interpretivist paradigm hence the data was analyzed following a principle of reductionism and generalizability, indicating an inductive approach (Saunders et al., 2019). **Paper F** follows a pragmatic paradigm where data was collected and analyzed in two phases where findings from the first phase are used as input in the second phase. Thus, implying an abductive approach involving moving back and forth inductive and deductive approaches.

3.3.4 Choice of method

Opoku et al. (2016) emphasizes that irrespective of the chosen research methodology, it is crucial to verify that the methods for data collection are appropriate and able to fulfill the study goals. Creswell (2003) further highlights that no single strategy is better than another, and the specific research questions should guide the selection of inquiry strategy, methodology, and analysis.

Researchers usually choose quantitative or qualitative methods. Some paradigms may lead the researcher to favor one method over the other, but no paradigms

prohibit the use of either method (Creswell, 2003). Regardless of the researcher's paradigm, to ensure effectiveness of the research, it is recommended that both approaches are applied (Creswell, 2003), leading to mixed methods. Mixed methods are defined as a research approach that integrates both 'quantitative' and 'qualitative' methodologies (Symonds & Gorard, 2010). This approach is valued for its comprehensive utilization of information, fostering critical analysis and enhancing impact (Gorard & Taylor, 2004). Tashakkori and Teddlie (2010) used the analogy of being lost in the woods with a compass, a mobile phone, and a flashlight – using all available tools significantly increases the likelihood of finding a way out, compared to relying on just one.

The use of mixed methods facilitate triangulation, enhancing study quality through greater scope, depth, and rigor (Easterby-Smith et al., 2021; Saunders et al., 2019). Triangulation can be viewed in four ways; data triangulation, methodological triangulation (using mixed methods), theory triangulation (incorporating several perspectives) and investigator triangulation (done by several researchers) (Easterby-Smith et al., 2021).

This thesis employs both qualitative and quantitative methods across various papers, with one using mixed methods as required to meet the research objectives. Qualitative approaches, providing insights and including respondent perspectives, are utilized in **Papers A, B, C, and D**, termed as mono-qualitative methods by Saunders et al. (2019). **Paper D** adopts a quantitative approach, referred to as a mono-quantitative method by Saunders et al. (2019). **Paper F** implements mixed methods as described by Easterby-Smith et al. (2021), where each step's findings inform and enrich the subsequent step.

This thesis predominantly utilizes qualitative methods, as reflected in the individual papers. This approach aligns with the thesis's main objective of gaining a deeper understanding of the topic, rather than generalization (Saunders et al., 2019). This exploratory nature meant the research began with a broad scope and progressively

narrowed down, thus explaining the dual-funnel approach, starting with the exploration of several soft factors and eventually focusing on one predominant factor, is consistent with the process described by Saunders et al. (2019).

3.3.5 Sampling strategies

This section outlines the data sampling techniques employed in the papers of this thesis. As it is paper-based, each paper had distinct objectives contributing to the thesis objective, as detailed in Table 3-6. Corresponding to their specific objectives, each paper implemented its own sampling strategy, though these strategies were not mutually exclusive. The details of these strategies are presented below.

Table 3-6: Research objectives for each paper

PAPER ID	Objective
Paper A	To gain insights on the importance of soft factors in digitalization projects
Paper B	To explore challenges in digitalization projects
Paper C	To explore critical soft factors that facilitate the success of digitalization projects
Paper D	To explore how learning for innovation is perceived in the context of digitalization projects pertaining to enablers, challenges, and outcomes.
Paper E	To examine how organizations are paying attention pertaining to implementing the factors that facilitate learning in the digitalization projects
Paper F	To examine how organizations can improve the readiness of employees to tackle uncertainties in digitalization project environments

In addressing the respective objectives identified, several research strategies were adopted. According to Saunders et al. (2019) and their research onion model, the strategies adopted include archival research, surveys, and narrative inquiry.

3.3.5.1 Narrative inquiry

Narrative inquiry is a method of research that focuses on collecting stories told by organizational members (Easterby-Smith et al., 2021). It can include participant observation or interviews allowing researchers to adopt either 'detached' or 'involved' stances (Easterby-Smith et al., 2021). **Paper F** is based on semi-structured open-ended interviews (**Appendix A-4**). Despite the criticism that narrative inquiry does not offer much that is distinctive or additional to *'normal'* qualitative research, it possesses significant strengths such as providing holistic perspectives on organizational behavior, facilitating the exploration of individual-organization relationships, and incorporating values into the research process (Easterby-Smith et al., 2021).

3.3.5.2 Archival research

Archival research entails analyzing a variety of documents and media. **Papers A, B and C** in this thesis utilize this approach. While relying on secondary data, archival research can be time-consuming in gathering relevant information, and can be mitigated by employing a systematic approach (Welch, 2000). **Paper C** implemented a systematic approach for literature review, drawing from methodologies outlined by (Okoli & Schabram, 2010) and (Levy & Ellis, 2006) and following recommendations for conducting systematic reviews in the management field, in line with the guidelines provided by Tranfield et al. (2003). Adhering to a systematic literature review process is crucial for managing knowledge diversity in academic research (Tranfield et al., 2003).

Paper A utilized archival documents, analyzing records from a completed digitalization project in the health sector. **Paper B** partially employed archival research, examining 26 reports from project assignments that included reflections

spanning the entire project lifecycle. This archival research complemented a survey with open and closed-ended questions, administered both before the project's initiation and after its completion.

3.3.5.3 Survey

Easterby-Smith et al. (2021) identify four types of surveys: inferential, factual, cross-sectional, and exploratory. This thesis employed two types: inferential and factual surveys. Inferential surveys aim to establish relationships between variables and concepts, particularly in isolating factors and exploring causal relationships (Easterby-Smith et al., 2021). Such surveys require researchers to determine dependent and independent variables (i.e., predictors). In **Paper F**, a mixed methods approach was used. Based on factors identified from interviews, dependent and independent variables were established, and an inferential survey was developed to investigate which factors contribute to the success of digitalization projects amidst uncertainty.

Factual surveys are aimed at collecting and collating 'factual' data from different groups of people (Easterby-Smith et al., 2021). According to Easterby-Smith et al. (2021), 'factual' data can also be collected through structured interviews. To address objectives in **Papers B** and **D**, a combination of open and closed-ended questions was employed, facilitating the incorporation of respondents' individual perspectives. Conversely, **Paper E** exclusively utilized closed-ended questions, aimed at evaluating the relevance of factors identified in existing literature.

3.3.6 Time Horizon

In this layer of the research onion, the researcher decides whether the study should capture a snapshot of the status at a particular time or track development over a period. Researchers typically choose between two time horizons: longitudinal studies, which observe changes over time, and cross-sectional studies, which analyze data at a specific point. Saunders et al. (2019) suggest that the metaphors

'snapshot' and 'diary' best describe these time horizons in research design, with 'snapshot' representing cross-sectional and 'diary' denoting longitudinal studies.

A cross-sectional study involves data collected at a single point in time. This approach was predominant in the thesis, with data for 5 out of the 6 papers **(Papers A, C, D, E, and F)** collected in this manner. These papers provided snapshots of the status at specific times, which was adequate to meet the objectives of both the individual papers and the thesis as a whole.

Conversely, longitudinal studies involve data collection at multiple intervals over time, capturing developments. In **Paper B**, data was gathered in two phases: before the project's start and after the completion of the digitalization project. It was hypothesized that capturing respondents' perspectives both before and after their involvement in digitalization projects would result in valuable insights.

3.3.7 Data collection and analysis

The final layer of the research onion is the data collection and analysis techniques (Saunders et al., 2019). Each paper within the thesis employed a distinct technique, although some similar methods were utilized across multiple papers.

3.3.7.1 Interviews and focus group discussion

Semi-structured open-ended interviews were used to address the objectives of **Paper F**. All the analysis was conducted using NVIVO software. A focus group discussion was then held to corroborate the findings from the interviews and gain additional insights.

3.3.7.2 Survey

Throughout the research, three distinct surveys were conducted. **Paper B** was based on a survey featuring open-ended questions (see **Appendix A-2**), where Part I was analyzed using NVIVO software, and Part II was analyzed with Microsoft Excel. The qualitative nature of the survey questions in Section II of **Appendix A-3** informed

the basis of **Paper D**, necessitating qualitative data analysis via NVIVO software. **Paper E**, addressing its objectives through Section III of **Appendix A-3**, comprised closed-ended questions and thus required quantitative analysis. Similarly, **Paper F** (survey presented as **Appendix 1**) also necessitated quantitative analysis. In both cases, the quantitative data were initially formatted in Microsoft Excel and then imported into the SPSS statistics package for descriptive analysis.

3.3.7.3 Systematic literature review

Paper C followed a systematic literature review strategy as shown on Figure 3-3 below.

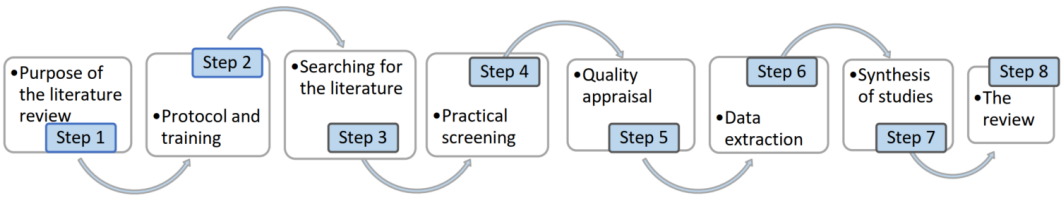

Figure 3-3: Systematic literature review approach

3.4 Ethical considerations

This research strictly adhered to all ethical considerations, particularly regarding participant privacy. To maintain absolute anonymity, no personal information that could identify participants was asked for or used. The Norwegian Centre for Research Data (NSD) classifies data such as national identification numbers, names, email addresses/IP addresses, or voice recordings as personal data. By avoiding such information, not only were ethical standards upheld, but participants also felt a greater sense of freedom to express themselves, potentially offering insights they might not have shared otherwise. Additionally, several steps were taken to ensure participant comfort. These included obtaining permission from their supervisors/managers before interviews, scheduling interviews at times that did not

disrupt their work, and choosing interview locations, either at their offices or online, for convenience and ease

3.4.1 Surveys

To adhere to research ethics in conducting the survey, participation was entirely voluntary and free from any form of coercion. Additionally, confidentiality was rigorously observed by ensuring anonymity in the responses. This was achieved by neither collecting nor processing any personal information that could link the responses back to individual respondents

3.4.2 Interviews

Participation in the study was voluntary, with participants being identified by a management representative in their respective organizations. To ensure participant comfort and openness during interviews, no audio recordings were made. This approach also supported full confidentiality and anonymity, as no identifiable information was collected or analyzed. Furthermore, in compliance with organizational requirements, one organization necessitated a legal agreement to protect company information, which was duly signed in conjunction with the organization's representative.

3.5 Validity, Reliability and Generalizability

Validity refers to the degree to which a test accurately measures what it claims to measure (Gravetter & Forzano, 2012). Researchers use various types of validity to validate their tests. In qualitative research, both face validity and content validity are essential. Face validity pertains to the extent to which a test seems to measure what it is supposed to (Gravetter & Forzano, 2012), while content validity, a non-statistical type, is often assessed through expert opinions. The questions in **Papers**

E and F were thoroughly reviewed to ensure they effectively measured the intended concepts

The scale items in **Paper F** were validated using principal components factor analysis (PCFA) for unidimensional construct. Factor reduction was conducted and all items with factor loading <0.7 (Henseler et al., 2009). The Kaiser– Meyer–Olkin (KMO) values of all of the variables exceeded the recommended value of 0.60 (Kaiser, 1974) and Barlett's Test of Sphericity was statistically significant at <0.001 (Bartlett, 1954) implying appropriateness of the data obtained in each construct. Although the interviews were semi-structured in **Paper F**, validity was ensured through following an interview protocol despite allowing integration of additional follow up questions to enable cultivating different respondents' perspectives. **Paper A** used archival documents which potentially enhances the validity and reliability of the case study by bridging certain data gaps (Welch, 2000).

Generalizability refers to the extent to which findings from a specific study can be applied to a broader population (Rentz, 1987). For questions that are subjective or based on perception, as in **Papers B and D,** achieving generalizability can be challenging, especially outside similar environments. A common method to assess the generalizability of research is to present findings to expert groups for evaluation (Bryman, 2016). In **Paper F**, to address external validity (generalizability), interview findings were presented to and validated by a group of project practitioners in a focus group discussion. **Paper C** adheres to a well-established systematic review methodology, thereby ensuring its reliability, validity, and generalizability.

3.6 Limitations

Paper A relied on archival data. As noted by (Bowen, 2009), there is a risk that existing documents might not adequately address the research question, potentially limiting the study. However, since **Paper A** primarily aimed to explore the

phenomenon under study, it is believed that this limitation did not significantly impact the findings. **Paper B** sought to understand the characteristics of digitalization project environments through project assignments. While this environment was not a direct real-life project setting, the results affirmed that the experience authentically reflected the realities of working within digitalization project environments.

Paper C, exclusively based on literature review, faced limitations due to varying terminologies (such as 'digitalization projects', 'digital transformation projects', and 'digitization projects'), the choice of databases, and the relatively low prominence of the term “digitalization projects” in project management literature. These factors could have constrained the identification of relevant publications. **Paper D** utilized open-ended survey questions, which did not capture the respondents' body language. This absence potentially limited the interpretation of results, as body language can offer additional insights into respondents' states of mind. **Paper E** employed a Likert scale ranging from 1 to 5 for rating questions. There was a risk of respondents misinterpreting the questions, leading to ratings that did not accurately reflect their intentions. Additionally, respondents were asked to rate both personal and management-related factors. Given that the respondents included team members and project managers, there was a possibility of bias in their responses.

3.7 Summary of research approach based on the research onion

Table 3-7 below provides the summary of the thesis research approach following Saunders research onion.

Table 3-7: Summary of research approach for the thesis

Paper	Paper A	Paper B	Paper C	Paper D	Paper E	Paper F
Philosophy						
Theory development approach	Inductive	Inductive	Inductive	Inductive	Inductive	Abductive
Methodological choice	Mono-method qualitative	Mixed methods	Mono-method qualitative	Mono-method quantitative	Mono-method quantitative	Mixed methods
Sampling strategy	Archival research	Survey Archival research	Archival research	Survey	Survey	Narrative inquiry and survey
Time horizon	Longitudinal	Cross-sectional	Longitudinal			
Data collection	Project case document review (1)	Open and closed-ended questionnaire (53) and project reflection reports (26)	Systematic literature review (35)	Open-ended questionnaire (97)	Closed-ended questionnaire (97)	Semi-structured interviews (17), small focus group discussion (7) and questionnaire (51)
Research question	RQ1	RQ1	RQ1, RQ2, RQ3	RQ3	RQ3	RQ2, RQ3

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4 Findings from individual papers

This section describes the findings from each individual paper. As the research was conducted in three phases, the findings are presented phase-wise.

4.1 Phase I: Exploratory phase

The research began with an exploratory study. This initial phase contributes to addressing the research questions by offering a comprehensive and general overview of the challenges in digitalization projects.

4.1.1 Findings from paper A

Henriette et al. (2015) emphasize the challenges in realizing digitalization projects, based on a systematic literature review of 13 articles. They identify research gaps, including managing digital transformation. Similarly, Sandkuhl et al. (2020) stress the need to clarify the interdependencies of success factors in digital transformation. This view is supported by Baier et al. (2022), who advocate for considering the interactions among success factors in project success studies.

Paper A aims to bridge existing research gaps by providing insights into the interplay of soft factors in managing digitalization projects. It contributes to the ongoing discussions on digitalization project success factors, particularly emphasizing the importance of securing end-user buy-in. The paper explores a two-way relationship: how end-users within an organization can affect the success and longevity of digitalization projects, and conversely, how these projects impact the end-users.

Paper A highlights two key findings: firstly, it identifies three crucial actors contributing to the success of digitalization projects; secondly, it introduces and validates a conceptual framework (Figure 4-1), which illustrates the inter-relationships among soft factors in the context of digitalization.

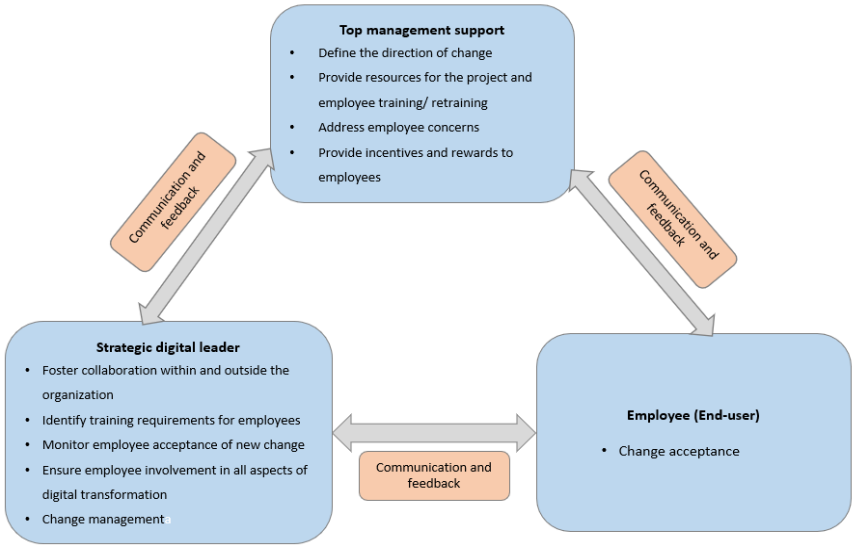

Figure 4-1: A conceptual framework for analysis of the relationship between soft factors (redrawn from (Ngereja et al., 2020)

4.1.1.1 "Actors" driving digitalization project success

The success of digitalization projects hinges on three key drivers: top management, end-users, and the digital leader. The findings emphasize the importance of understanding the project's impact on end-users' workload and processes. While top management's commitment to providing resources and training is noted, their support falls short in addressing early concerns and providing clear direction for organizational change. This suggests that mere monetary support is insufficient without proactive and comprehensive management engagement.

The digital leader is recognized as a vital 'connector' bridging the gap between upper and lower levels of the organization. Appointing a chief digital officer is identified as a key step for successful digitalization (Larjovuori et al., 2016; Maedche, 2016; Singh & Hess, 2017). However, the findings reveal that although a new director was appointed for the initiatives, the lack of a clear definition of his role in the project may have led to limited acceptance by end-users. The digital leader's responsibilities

include fostering a culture of transformation, managing change, encouraging collaboration, and ensuring end-user acceptance of the changes.

The study reveals a significant lack of collaboration among project participants, leading to 99% of end-users expressing dissatisfaction with the changes. This aligns with Cooke-Davies (2002) definition of project failure, where an excessive focus on project objectives can neglect other critical success factors, resulting in end-user rejection. This case exemplifies the consequences of poor communication and the lack of end-user involvement in project planning and implementation. Inclusivity, where end-users feel actively involved in the change process, is crucial for acceptance. Unfortunately, in this instance, end-users were treated as external entities rather than integral components of the project, highlighting the detrimental effects of poor communication and exclusion on the success of digitalization projects.

4.1.1.2 Interconnectedness of soft factors

Paper A synthesizes theoretical support from literature and introduces a framework that illustrates the interdependencies among various soft factors in digitalization projects. These factors include top management support, collaboration, communication, employee involvement, the role of the digital leader, training and retraining, competencies, rewards and incentives, and end-user acceptance of change. Upon testing, the framework revealed two distinct types of interconnectedness: while some serve as the foundation for other factors like top management support, other factors are inherent within others; for example, rewards and incentives are part of top management support, while collaboration, though a standalone factor, is also a responsibility of the digital leader.

This interconnectedness suggests that organizations should adopt a holistic approach to implementing these factors, rather than selectively choosing among them. This concept aligns with the findings of Sandkuhl et al. (2020), who emphasize that success factors are not isolated but overlap in their use of information and

knowledge, leading to multiple processes utilizing the same resources. Similarly, (Jacobi & Brenner, 2018) identify three interdependent success factors for digital transformation: leadership & vision, culture & people, and corporate processes & structure. They stress that achieving success in one area does not equate to overall success across the corporation.

Paper A addresses a notable gap in existing research on soft factors in project management, where most studies identify these factors but fail to explore their interrelations, leading to a knowledge gap. Sandkuhl et al. (2020) argue that understanding these factors without knowing how they interact is insufficient for practitioners. To address this, establishing the dependencies among these factors is crucial for decision-makers in organizations pursuing digitalization initiatives. These dependencies aid in determining which factors to implement, how to implement them (via consistent communication and feedback), and who is responsible and how they can contribute to the successful implementation, whether it be digital leaders, top managers, or employees.

4.1.2 Findings from Paper B

The main objective of this paper is to contribute to the discourse on challenges in digitalization and strategies to address them. The study was conducted in two phases: before and after project implementation. This approach was chosen to observe the evolution of perspectives and experiences over time. The pre-implementation data analysis revealed a general understanding of digitalization challenges, but this understanding was theoretical rather than experiential, lacking personal reflection. Moreover, the initial reflections on success factors were limited to general managerial challenges common to all types of projects, as the respondents had not yet been exposed to the specific environment of digitalization projects.

After the project's completion, a significant development in the respondents' experience with digitalization projects was observed. Their post-project reflections were grounded in lived experiences, identifying challenges beyond just managerial aspects, including technological and innovation-related issues. There was a noticeable increase in understanding how to address these challenges, informed by personal experience. The feedback highlighted that in digitalization projects, it is essential to consider all areas of concern, with soft factors playing a critical role in managing the interplay between innovation, digital technologies, and organizing, as shown in Figure 4-2. Additionally, three factors emerged as central, intersecting all three pillars. These factors serve as 'building blocks ' and include; (i) team commitment, (ii) good leadership and a positive working environment, enabling the effective exercising of other soft factors.

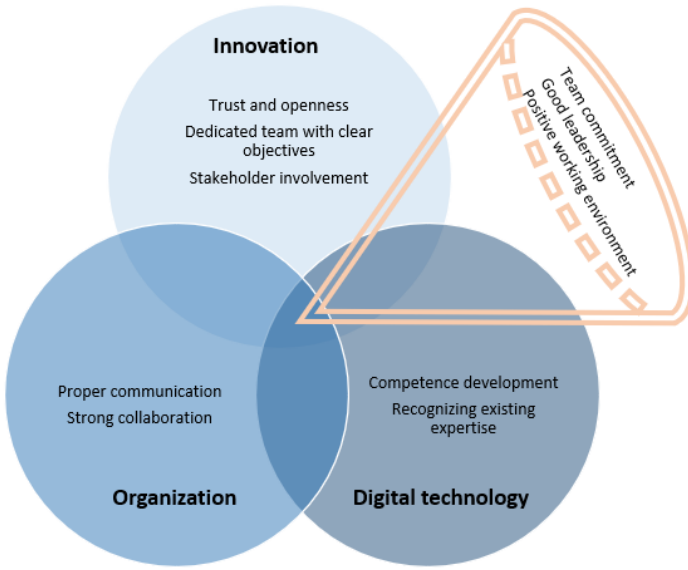

Figure 4-2: The influence of soft factors on facilitating the interplay between innovation, organization, and digital technology

The soft factors that fostered innovation in the team included: (i) trust and openness, (ii) a dedicated team united by a clear, collective project objective, and (iii) consistent stakeholder involvement throughout the project. This flexibility allowed the team to adaptively integrate stakeholder feedback into the product. Regarding digital technology use, the key soft factors were: (i) enhancing competencies through individual learning, and (ii) leveraging existing expertise within the team. For effective project organization, crucial factors were: (i) robust communication among team members, facilitated by physical meetings and ICT tools when in-person interactions were not feasible, and (ii) strong collaboration between team members and stakeholders.

Furthermore, two key risks were identified in the undertaking of digitalization projects that require careful management:

- Over-reliance on a few individuals during planning and execution due to their expertise, which raises concerns about the potential impact on the project if these key persons become unavailable.
- A mismatch between planning and execution, particularly when different teams are involved in each phase, can lead to numerous avoidable changes

4.2 Phase II: The turning point

4.2.1 Findings from the paper C

This paper aims to contribute to the discussion on effective management of digitalization projects, a need highlighted by Barthel and Hess (2019). While existing literature explores specific soft factors or their interrelations in digitalization contexts, the significance level of these factors remains largely unexplored. For instance, Osmundsen et al. (2018) reviewed the drivers and success factors of digital transformation broadly, without focusing specifically on digitalization projects.

4.2.1.1 Framework for successful implementation and adoption

The findings from Paper C showed that the successful implementation and adoption of digitalization projects require multi-level readiness, at organizational, project, and individual level. Furthermore, the findings indicated that both adoption and implementation of digitalization projects have similar core enablers at organizational level, which require significantly different actions to be taken at project level and tend to display slightly different characteristics at individual level as shown in Figure 4-3.

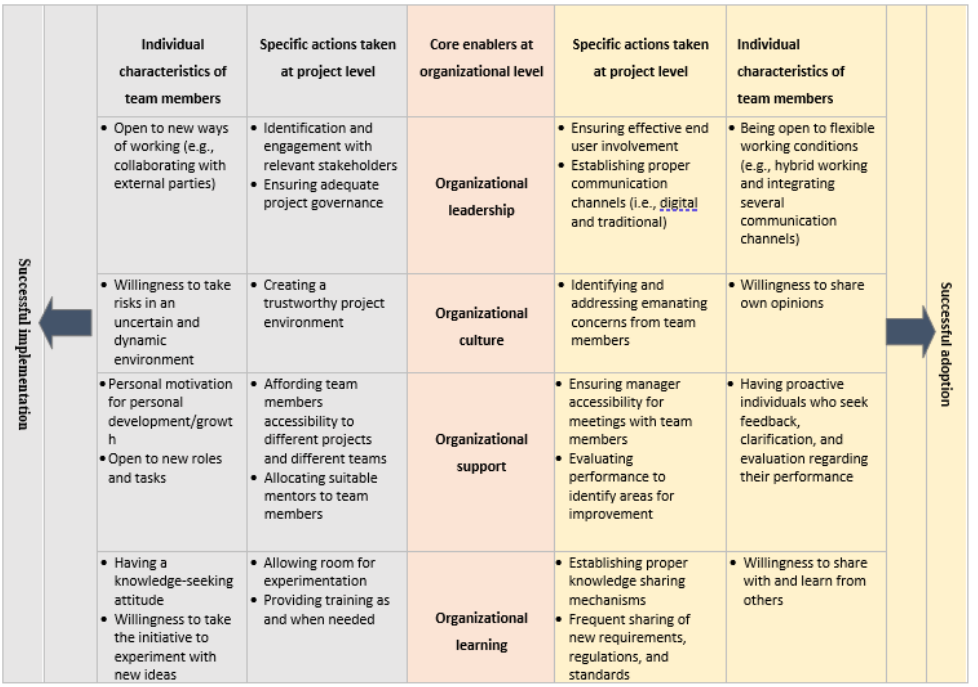

Figure 4-3: An integrated framework for the successful implementation and adoption of digitalization projects

Through the proposed framework presented, the multifaceted nature of successful implementation of digitalization projects is highlighted. Due to this nature, enablers should also be multi-level integrating organizational, project, and individual levels. This framework may be adopted as a guide, showing the soft factors that

organizations should prioritize for more effective implementation and adoption processes. By highlighting the necessity for multiple enablers at various levels, the framework enables organizations to strategically distribute their efforts, achieving a balanced approach to resource allocation. The framework also serves as a risk management tool, aiding in identifying potential risks across various levels within the organization.

4.2.1.2 Critical soft factors

Eight soft factors were found to be critical in the digitalization projects. These are learning, organizational support, collaboration, organizational leadership, end user involvement, organizational culture, provision of training, and soft skills of project managers. Learning was found to rank higher than the rest, signifying its criticality in influencing the outcomes of digitalization projects. Table 4-1 below provides more details of the soft factors and the respective studies where they were identified to be critical.

Table 4-1: Soft factors ranked as important for successful digitalization projects

Soft factors	Reference
Learning	(Barthel & Hess, 2020); (Fountaine et al., 2019); (Guinan et al., 2019); (Gupta et al., 2018); (Hung et al., 2014); (Sarantis et al., 2011); (Snow et al., 2017); (Tijan et al., 2021); (Zhang et al., 2021)
Organizational support	(Abollado et al., 2017); (Bandara et al., 2021); (Barthel & Hess, 2020); (Fitzgerald et al., 2014); (Hung et al., 2014); (Jha et al., 2020); (Mikalef et al., 2019); (Ouadahi, 2008)
Collaboration	(Guinan et al., 2019); (Mikalef & Gupta, 2021); (Patil & Suresh, 2019); (Roberts et al., 2021); (Snow et al., 2017); (Tijan et al., 2021); (Tronvoll et al., 2020); (Wickström et al., 2020)
Organizational culture	(Fountaine et al., 2019); (Gupta et al., 2018); (Jha et al., 2020); (Mikalef & Gupta, 2021); (Roberts et al., 2021) (Tronvoll et al., 2020)
End-user involvement	(Abollado et al., 2017); (Bandara et al., 2021); (Barthel & Hess, 2020); (Gil-García & Pardo, 2005); (Zhang et al., 2021)

Organizational leadership	(Jha et al., 2020); (Ouadahi, 2008); (Roberts et al., 2021) ; (Snow et al., 2017); (Wickström et al., 2020)
Provision of trainings	(Gil-García & Pardo, 2005); (Gupta et al., 2018); (Jha et al., 2020); (Ouadahi, 2008); (Tursunbayeva et al., 2020)
Soft skills of project manager	(Gil-García & Pardo, 2005); (Gupta et al., 2018); (Musa et al., 2012); (Patil & Suresh, 2019); (Snow et al., 2017)

4.3 Phase III: Main study

4.3.1 Findings from paper D

This paper addresses the gap in understanding managers' perceptions in digitalization initiatives, a topic recently explored by Fernandez-Vidal et al. (2022) focusing on top managers' views. It also responds to the call by Appio et al. (2021) for research on empowering individuals in digitalization projects and examining the micro-level factors influencing learning processes in teams. Our contribution lies at the intersection of digital transformation and innovation management, areas that Appio et al. (2021) note lack a unified perspective and overarching framework to guide future theoretical and empirical studies.

Paper D investigates the perception and experience of learning for innovation within organizations. It delves into how project personnel perceive the factors that facilitate or impede their learning for innovation, specifically in the context of digitalization projects. Additionally, the paper seeks to understand and gather evidence of learning in the digitalization context..

4.3.1.1 The perception of learning for innovation

The findings indicated that the majority of participants had adequate understanding on both learning and innovation, along with their interdependence. Despite the general consensus among project team members about learning for innovation, two distinct perspectives emerged. One group viewed it as the acquisition of new

knowledge or building upon existing knowledge, while the other associated it with adopting new methods of operation, implying a change in behavior.

4.3.1.2 Enablers of learning for innovation

Four factors stood out as key enablers of learning for innovation: a supportive work environment, top management support, the nature of the job itself, and a willingness to learn. The majority of respondents agreed that a supportive work environment is essential for fostering innovation-oriented learning. For team members to effectively learn, an environment that encourages openness and the sharing of opinions without fear of penalty is necessary. Additionally, innovation requires opportunities for trial and error.

There was consensus that top management support is critical for fostering learning and innovation within an organization. Individual efforts, without the endorsement or backing of top management, often prove futile due to their pivotal role in setting the organization's strategic direction. Furthermore, the nature or type of job plays a significant role in motivating individuals to learn for innovation.

Certain roles, being more dynamic, necessitate staying abreast of ongoing knowledge developments. Granting employees autonomy in their tasks not only allows them to explore and devise solutions but also enhances their learning during task completion. Jobs that are inherently more hands-on tend to engage employees more effectively, promoting experiential learning. Additionally, work flexibility contributes to learning for innovation by affording employees the time to acquire new skills. For example, a flexible work schedule enables employees to participate in online courses or training sessions that can enhance their work performance.

In addition to external factors, the willingness to learn emerged as a critical enabler. Regardless of an organization's provision of necessary facilitators, the absence of an employee's personal drive renders these efforts ineffective. The participants unanimously agreed on the significance of internal motivation for learning.

4.3.1.3 Hinderances of learning

The findings identified several barriers to learning for innovation, including internal competition among peers, a leadership style unsupportive of learning, excessive workloads, and the lack of performance appraisals. Team members expressed that a competitive environment, as opposed to a collaborative one, likely hinders learning. In such settings, individuals tend to withhold knowledge rather than share it openly, fostering a counterproductive atmosphere that restrain learning both within the team and across the organization

A leadership or management style that fails to support learning significantly hinders innovation. Participants noted that leaders who take credit for their subordinates' work, a practice known as 'overshadowing,' demotivate their teams. Additionally, it was observed that some leaders refrain from encouraging continuous learning among employees due to fears of them seeking higher-paying jobs elsewhere. While this concern is valid, it overlooks the potential value gained from having more knowledgeable employees. A leadership focus on results over employee growth limits opportunities for team learning and innovation. Consequently, team members may only fulfill basic expectations and lack the motivation to pursue further learning.

The study also revealed that a high workload combined with intensive supervision restricts learning opportunities. Team members noted that the absence of individual performance appraisals hinders learning, as setting learning expectations can stimulate the drive to overcome challenges. Furthermore, having clear performance objectives encourages employees to explore various methods to meet and exceed these targets, thereby fostering learning and innovation in the process.

4.3.1.4 Immediate impact/evidence for learning for innovation

The findings centered on four key indicators: improved work efficiency, behavioral change, enhanced problem-solving ability, and increased knowledge sharing. Project team members indicated that they perceive learning for innovation through

noticeable improvements in work efficiency, such as completing tasks in less time or gaining confidence in decision-making. Some participants linked learning evidence to more effective resource utilization in achieving goals. Additionally, it was observed that organizational recognition serves as a validation of new learning and its innovative application, highlighting its impact and acknowledgment.

Another signifier of learning and innovation among team members was a noticeable change in their behavior and work methods. They also observed a shift in how colleagues perceive and interact with them regarding work tasks. An increased ability to solve problems, and a boost in confidence to handle tasks independently, were also identified as indicators of learning for innovation. Furthermore, the ease of sharing knowledge among team members was seen as additional evidence of successful learning. These findings are illustrated in Figure 4-4.

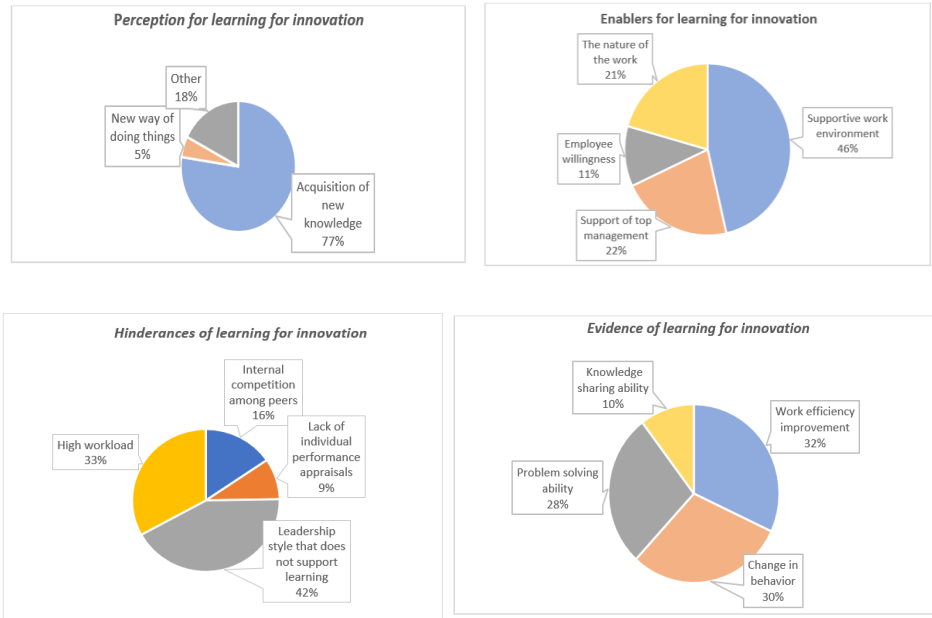

Figure 4-4: Perception, enablers, and evidence of learning for innovation

4.3.2 Findings from paper E

This paper contributes to the discussion by Sanchez-Segura et al. (2021) by focusing on the factors contributing to the low success rate of digitalization projects. A critical aspect explored is the 'knowing-doing gap' identified by Kane (2019), which highlights the discrepancy between awareness of an issue and taking action to address it. Our research reveals that while employees in organizations generally display a willingness and commitment to learn, top management often lacks a similar commitment to supporting learning and creating a conducive learning environment.

Findings from **Paper E** reveal a widespread recognition among team members and project managers of the factors that facilitate learning in digitalization projects, encompassing personal, management, and environmental aspects. However, there is a notable disparity in how these factors are implemented. The research indicates a high level of willingness and commitment to learning among employees, with over 93% expressing agreement or strong agreement. In contrast, commitment from top management to support learning is considerably lower, with just over 65% in agreement. Similarly, the presence of a supportive learning environment is confirmed in some, but not all organizations, with 70% in agreement. Therefore, the findings highlight a gap in management's focus on learning in digitalization projects compared to the emphasis on employee and environmental factors.

4.3.2.1 Employee related factors

The results reveal strong positive attitudes among participants towards learning and collaboration: 92% agree or strongly agree that they are keen to engage in discussions, debates, and knowledge sharing with colleagues; 97% are eager to acquire new knowledge and maintain an open-minded attitude; 96% show a willingness to adapt and embrace change rather than clinging to old ideas; and 90% are not hesitant to seek help or admit the need for assistance in task resolution. While these employee-related factors, such as eagerness and commitment to learn

are crucial, the study underscores that achieving effective learning is contingent on top management's commitment to fostering a learning culture.

4.3.2.2 Management related factors

The survey results reveal a moderate level of support from senior management for learning and development activities in organizations: 75% of participants agree or strongly agree that senior management encourages knowledge sharing, debate, and engagement in learning activities; 61% feel encouraged to seek knowledge beyond the organization's boundaries; 65% acknowledge management's efforts to establish an inclusive work environment; and an equal 65% agree that senior leaders are approachable for discussions about tasks and career development. These findings are somewhat surprising, given the strong emphasis in existing literature on the critical role of top management commitment in stimulating learning in digitalization projects, as highlighted by researchers like (Arfi et al., 2020; Gellerstedt et al., 2019); Schuchmann and Seufert (2015); (Wolf et al., 2018).

The finding aligns with Bencsik (2020) observation that, in the context of digital transformation, managers recognize the urgency of the situation but often fail to make the necessary preparations. Bencsik further emphasizes the need for managers to reassess their approach, particularly in areas like motivation, managing integration conflicts, competence development, training, leadership style adjustments, and cultural shaping. Similarly, Mooney et al. (2022) underscore this issue, noting experts' concerns about executive complacency in digitalization, or as they comment 'executives appear to be asleep at the switch'. This view mirrors the warning by Siebel (2017) that digital changes will happen at a rapid pace. Bughin and Van Zeebroeck (2017) add that while leaders recognize the need for action in the face of digital challenges, they often lack clear guidance on the best course of action. Pinkowska (2007) highlights that although the social skills of project managers and the nuances of soft factor processes are difficult to measure, their impact on project success is significant and quantifiable.

4.3.2.3 Environment related factors

The survey results indicate a positive organizational environment for project work: 74% of participants agree or strongly agree that team members are co-located or easily accessible to each other, whether physically or digitally; 61% confirm that their organizations do not penalize mistakes during task execution; and 75% acknowledge the presence of many experienced individuals from whom they can learn. These aspects underscore the influence of environmental factors, which are largely shaped by top management's strategies, as pointed out by Arfi et al. (2020) and Wolf et al. (2018). There exists a strong link between management and environmental factors, as management strategies directly impact practices like encouraging experimentation and refraining from punishing mistakes at the task level.

4.3.2.4 The relationship between employee, management, and environment related factors

The research indicates that environmental and personal factors in digitalization projects are significantly influenced by management-related factors. This aligns with **Paper A** that the key factors for digitalization project success are interconnected. Management-related factors are particularly pivotal as they directly shape both personal and environmental aspects. This finding corroborates that of Weingarth et al. (2019), who emphasized top management commitment as a foundational element for other success factors. However, it is notable that despite its importance, management-related factors receive the least attention in organizations. For successful digitalization, it is critical to address all three categories, which are personal, environmental, and management, as each contributes uniquely to the project's overall success. The interplay among these categories is depicted in Figure 4-5.

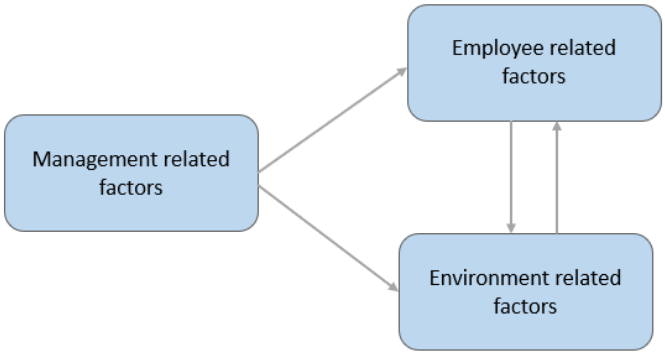

Figure 4-5: The relationship between personal, management and environment related factors towards learning

The findings of this paper emphasize on the gap between the current actions of strategic decision-makers and their expected roles. Executives are anticipated to make future-oriented decisions within rapidly changing and unpredictable environments, as noted by (Hafseld et al., 2021); Li (2020); (Morakanyane et al., 2017). This situation highlights the necessity for organizations to have permeable organizational boundaries that facilitate the free exchange of knowledge involving creating access to external knowledge sources, enhancing collaboration with external experts, and encouraging all organizational members to interact with external environments.

4.3.3 Findings from paper F

Research shows that digitalization projects are yet to be significantly explored. Hafseld et al. (2021) conducted research on causes of complexity in digitalization projects, highlighting the need for more comprehensive research in this area. **Paper F** further addresses the research demand highlighted by Fernandez-Vidal et al. (2022), on the necessity to understand the connection between digital transformation and learning. Given that this is a recent call for research, it suggests

a scarcity of studies in this field and the potential value of new insights from various perspectives.

Paper F set out with two primary objectives: firstly, to investigate the various factors that lead to uncertainty in digitalization project environments, and secondly, to uncover insights and strategies for effectively addressing these challenges.

4.3.4 Challenges of digitalization projects caused by uncertainty

The findings reveal that digitalization projects face multifaceted challenges at various levels - individual, project, and organizational - primarily stemming from the inherent uncertainties associated with these projects.

4.3.4.1 Individual level

Individual-level challenges in digitalization projects are characterized by a persistent knowledge gap, a dynamic work environment, and an impaired understanding of outcomes. The rapid pace of change in digital technologies necessitates continuous learning to acquire new skills and competencies. This constant evolution increases uncertainty, requiring employees to be flexible and adaptable. Additionally, a lack of clear understanding about the necessity and implications of change creates a challenging work environment, as employees are expected to perform tasks with incomplete or unclear information.

4.3.4.2 Project level

At the project level, challenges predominantly revolve around resource and knowledge management. Project managers are tasked with early planning for resources and knowledge in an environment rife with uncertainty. This poses significant challenges, as many aspects, including resource needs, skill requirements, and competencies, are often unclear at the onset, making comprehensive upfront commitment difficult.

4.3.4.3 Organizational level

At the organizational level, challenges appear to be associated with vision and change management. Top management faces the daunting task of defining the value, risks, and impact of digitalization projects upfront in an inherently uncertain environment. This difficulty is compounded when insufficient information leads to panic and frustration among employees, further complicating change management within the organization.

4.3.5 Strategies to address challenges caused by uncertainty

Similar to the challenges that emerged across various levels, that is individual, project, and organizational, the findings also identified strategies to address these challenges at the corresponding levels

4.3.5.1 Individual level

Addressing challenges at the individual level was observed to build individual adaptation capacity. This was found to be achieved through; fostering individual knowledge development and promoting personalized learning journeys and tailoring learning experiences to the needs of individuals.

4.3.5.2 Project level

Challenges at the project level, which appear to be primarily related to resources and knowledge, can be addressed by exposing team members to other teams and departments, strategically placing them in challenging environments such as demanding projects for acquiring new knowledge and skills, and through mentorship and coaching. Additionally, continuously identifying knowledge gaps and fostering the sharing of reflections on lessons learned are key strategies

4.3.5.3 Organizational level

At the organizational level, the identified challenges relate to change management and organizational vision. These challenges can be addressed by embracing external

collaborations, establishing an inclusive mindset within the organization, creating safe learning spaces, and prioritizing change initiatives.

Table 4-2 below summarizes these challenges and strategies to address them

Table 4-2: Addressing challenges associated with uncertainty in digitalization projects

Organizational level	**Digitalization projects**	
	Challenges associated with uncertainty	**Strategies to address the challenges**
Individual	-Persisting knowledge-gap -Dynamic work-environment -Impaired understanding of the outcome	-Fostering individual knowledge development -The use of personalized learning journeys
Project	-Resource management challenges -Knowledge-needs challenges	-Through cross-team and functional exposure -Embracing challenges -Mentorship and coaching -Continuous identification of knowledge gaps -Fostering sharing of reflections on lessons-learned
Organizational	-Impaired vision of expectations -Embracing familiarity over innovativeness	-Embracing external collaborations -Establishing an inclusive mind-set -Tailoring safe learning spaces Prioritizing change initiatives

4.3.6 The mediating role of absorptive capacity

The results of the combined effects of all absorptive capacity dimensions showed a positive and significant correlation between environmental adaptability and project

success (r = 0.490, p < 0.001), thus signifying the important role of organizational adaptability in facilitating success in digitalization projects. Thus, supporting the first hypothesis which states that there is an overall positive relationship between the organization's ability to adapt to changing environments and digitalization project success.

Furthermore, the findings confirmed the mediation role of absorptive capacity in the relationship between environmental adaptability and project success by a significant interaction (β = 0.469, p = 0.002). Hence, supporting the second hypothesis which states that absorptive capacity plays a mediating role between organizational adaptability to the changing environment and digitalization project success. These findings are illustrated in Figure 4-6 below.

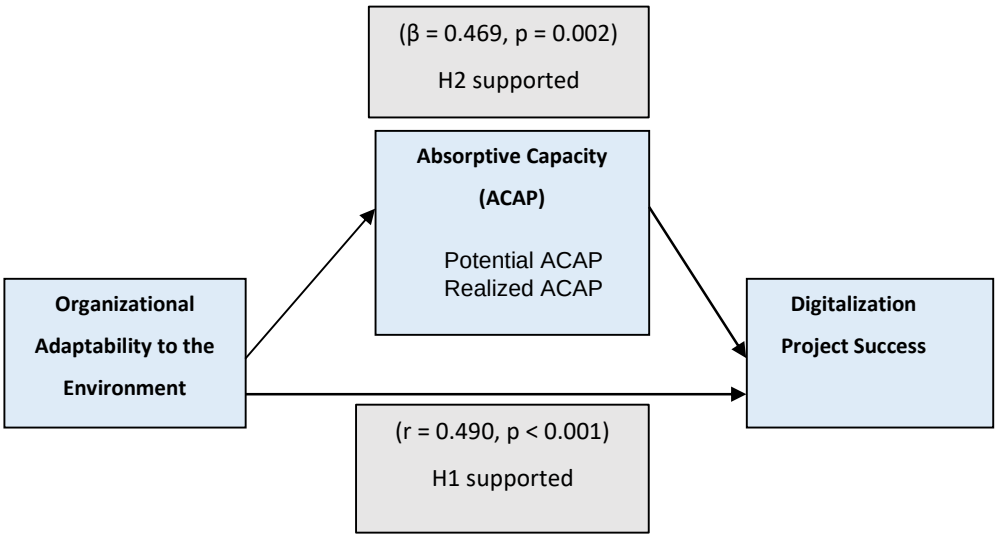

Figure 4-6: The mediating role of absorptive capacity in the relationship between organizational adaptability and digitalization project success

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5 Integrated Discussion

This chapter presents the integrated findings of the thesis, which offer a holistic perspective of multi-level factors within the organizational boundaries in the context of digitalization projects. The study ensures the inclusion of various perspectives at individual, project, and organizational levels to generate new insights and address the existing research gap. The study therefore presents a more nuanced understanding of digital transformation by considering individual, project, and organizational dimensions, advocating for tailored strategies that address specific learning and requirements at each level.

5.1 Approaching digital transformation through integration of perspectives across organizational levels

While no sector or organization is immune to the impacts of digital transformation, as noted by Thomas Hess et al. (2016), much of the existing research on management of digital transformation has predominantly focused on higher, organizational-level aspects (Dąbrowska et al., 2022), leaving other levels less explored. Typically, individual studies have limited their scope to the perspectives of a single group level — be it project managers, top managers, or employees. This thesis, utilizing multilevel theory, bridges this gap by providing a holistic integration of multiple levels. Such an approach not only contributes significantly to theoretical understanding but also has practical implications, offering a more detailed view of digital transformation across various levels within organizations.

This study explored the research problem from three distinct perspectives: the individual, project, and organizational perspectives. The aim was to ensure inclusion of perspectives at all organizational levels, hence this approach appeared suitable to serve the objective. Soft factors are very difficult to measure and quantify (Wohlin & Ahlgren, 1995), thus leveraging multiple viewpoints, the study aims to reduce subjectivity and provide a holistic understanding of the phenomenon.

At the individual level, the focus was on the roles, experiences, and perceptions of those involved in digitalization projects. This included examining team member interactions, their knowledge and skills, communication dynamics, and how their attitudes and behaviors influence project success. The insights emphasize the critical role of leadership, employee engagement, and cultivating a learning-oriented culture adaptable to the challenges of digital transformation.

At the project level, the focus was on the specific characteristics of digitalization projects, including their uncertainty and dynamic nature. We explored the factors influencing project success or failure and the crucial role of continuous learning in driving improvement and value creation. At the organizational level, the focus was on the wider context in which these projects are situated. We evaluated how prepared organizations are to adapt to environmental shifts and the effectiveness of their learning and knowledge management strategies.

By synthesizing insights from individual, project, and organizational perspectives, this thesis offers a nuanced understanding of the determinants of success in digitalization projects and the interconnections between various levels. This comprehensive approach fills a significant research gap in the study of digitalization projects. It provides valuable insights for both practitioners and researchers aiming to enhance the effectiveness of digital transformation initiatives.

Multilevel theory, supported by researchers like Weber et al. (2022) advocates for analyzing leadership behaviors across various management levels, such as top and middle management. This theory is instrumental in understanding the interconnections between phenomena at different levels of analysis, enriching our perspective of a particular subject (Klein et al., 1994; Rousseau, 1985). By integrating diverse perspectives, this approach showcases how individuals at various levels contribute to the overall process of digital transformation, as noted by Dąbrowska

et al. (2022). It allows for a more comprehensive understanding of interpretations and actions within the digital transformation context.

In the context of digital transformation, the significance of multi-level perspectives is emphasized by Kokshagina (2021) and Dąbrowska et al. (2022). Kokshagina (2021) emphasizes the necessity of incorporating multi-level perceptions in implementing digitalization initiatives within healthcare, ensuring effective management and clear assignment of responsibilities. Dąbrowska et al. (2022) offer a comprehensive view of digital transformation, examining it through four distinct lenses: individual (use and adoption of digital technologies), organizational (strategizing and information coordination), ecosystem (leveraging digital technologies in governance and co-creating value), and geopolitical (regulating environments for individuals and organizations). However, a notable limitation in existing frameworks, including that of Dąbrowska et al. (2022) is the absence of a project-level perspective. This thesis addresses this gap by incorporating the project level, offering critical insights to better understand and tackle the challenges specific to digitalization projects.

This study highlights the critical interdependencies among the three levels: individual, project, and organizational, revealing that these cross-level interactions are too significant to overlook. One of the key findings is the *multi-level impact of soft factors,* such as organizational culture. While existing literature acknowledges culture as a vital enabler of digital transformation, there's a lack of clarity on how culture is perceived and enacted across different levels, and what implications this has for tasks and responsibilities at each level. Therefore, while listing factors is a useful starting point, it is insufficient in isolation. A deeper understanding requires interpreting these factors appropriately at each level. By moving beyond a single decision-maker or actor perspective and considering the full spectrum of individual, project, and organizational dimensions, we gain a more comprehensive

understanding of the challenges in digitalization projects and insights into effective strategies for addressing them.

The findings of the thesis also underscores the critical need for empowering learning at all levels within and outside the organization, particularly in digitalization projects. Unlike previous studies that primarily concentrated on single-level learning, this research highlights the inadequacy of such an approach in the complex environment of digitalization projects. In a setting characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), rapid and flexible responses are essential, despite the presence of many unknown factors. Challenges and solutions vary across different organizational levels - individual, project, and organizational. Therefore, a single-level focus not only overlooks diverse challenges but also neglects potential solutions that are vital for effectively managing these challenges. This thesis advocates for an integrated approach, ensuring that learning and response strategies encompass all organizational levels to navigate the complicated landscape of digitalization projects.

It is crucial to recognize that learning at one level does not automatically translate to learning at another level, as the relationship between these levels is not linear. Each level presents its unique set of challenges and involves distinct primary actors: employees at the individual level, project managers at the project level, and top management at the organizational level. Consequently, the actions required to facilitate learning vary across these levels. In some cases, proactive or even forceful measures may be necessary to ensure that learning effectively takes place. This differentiation underscores the need for tailored strategies that address the specific learning dynamics and requirements at each level within the organization.

5.1.1 Understanding digitalization project success through the learning lens

Jacobi and Brenner (2018) highlight that merely focusing on cost reduction and efficiency improvements does not suffice for true digital advancement in an

organization. Instead, cultivating a digitally knowledgeable workforce is essential. In the context of digital transformation and sustaining competitiveness in today's business environment, performance and learning should be viewed as complementary objectives. Consequently, the metrics used to gauge project success should encompass not just performance indicators but learning outcomes as well. This dual focus ensures that organizations do not just achieve short-term efficiency gains but also foster long-term digital capabilities and adaptability.

Adopting a learning perspective on project success involves exploring new avenues for organizational and individual knowledge growth. This ties into the concept of an organization's absorptive capacity, which encompasses the identification, assimilation, transformation, and exploitation of knowledge (Arthur et al., 2001). Pursuing new knowledge can lead to both short-term and long-term enhancements of the organization's non-financial capital, elevating it to higher levels.

Conversely, when project success is viewed from a performance perspective, it focuses on leveraging the existing non-financial capital, such as pre-existing human capital. This approach primarily aims to maximize short-term benefits derived from these assets, capitalizing on the existing knowledge and skills within the organization (Arthur et al., 2001).

The complexity of organizational learning arises from the fact that it is a multi-level phenomenon, encompassing individual, group, organizational, and occasionally population levels of analysis (Schwab, 2007). Consequently, we analyze various typologies of project outcomes as outlined by Arthur et al. (2001), which take into account both performance and learning. We expand upon these typologies by examining them from the perspectives of individuals, projects, and organizations. A summary is presented in Table 5-1.

Table 5-1: Project performance and learning perspectives at different levels

	Project performance			Learning		
	Individual	Project	Organizational	Individual	Project	Organizational
Clear success	✓	✓	✓	✓	✓	✓
False success	✓	✓	✓	–	–	–
Clear failure	–	–	–	–	–	–
False failure	–	–	–	✓	(✓)	✓

When we incorporate all three organizational levels, success can be clear or false depending on the level it is at.

5.1.1.1 Clear success and clear failures

Clear success and clear failures are clear and straightforward for all levels. At an individual level, success is clearer when viewed from the learning lens. Individuals can measure their knowledge increase and position themselves better to undertake future projects. Employees are satisfied if there is competence development and that the project outcome meets their needs operation-wise. This is the only metric with which is clear for them in terms of skills, competences or expertise gained during their involvement in the project undertaking. Projects being classified as high performance does not necessarily have the same significance for them as individuals.

At the project level, success is easier to measure for the project manager using metrics such as time, budget, and quality. A project that meets these set performance metrics can be classified as high-performing. In terms of the organizational level, a project's designation as high-performing considers how the project outcomes translate into both short-term and long-term benefits. Projects therefore can be termed as clear success at organizational level if they achieve their

predefined goals and objectives, leading to organizational value in terms of finance, strategy, and operations over both short and long terms.

5.1.1.2 False success and false failure

The concept of false success and false failure becomes particularly interesting when viewed from the perspectives of individuals, projects, and organizations. In cases of false failures, where a project does not perform well but significant learning occurs, it highlights the potential for managing the success of upcoming projects by minimizing future failures. This type of success is more tangible at the individual level compared to the project and organizational levels. At the individual level, exposure to such experiences allows individuals to assess their skills and competence development, positioning themselves better for future projects. However, recognizing the value of this learning at the project and organizational levels requires additional effort and practices.

At the project level, the knowledge gained from a specific project may not directly impact completed projects but can serve as a benchmark for future endeavors. Its value depends on whether this knowledge is adapted and applied to future projects without altering the core values of the organization. This type of learning is referred to as single-loop learning, primarily focused on addressing symptoms rather than underlying core issues. In Table 5-1, it is represented in brackets, indicating that success exists but only to a certain extent.

At the organizational level, the learning process goes beyond project-specific knowledge. It involves questioning and updating core values, norms, policies, and structures in response to new insights and knowledge. This form of learning, known as double-loop learning, is particularly relevant in dynamically complex project environments where digitalization projects are undertaken.

When it comes to false success, where a project performs well but no significant learning occurs, both individuals and the organization miss out on the potential

value in terms of human capital development that could have benefited future projects. In the context of digital transformation, project management should not be solely focused on problem-solving; it should also emphasize the exploration and development of new knowledge that can be applied in future projects.

Traditionally, project management success has been defined in terms of meeting outcomes such as time, cost, and quality, as well as satisfying stakeholders. However, in the digital transformation context, where project environments are characterized by high dynamism and complexity, managing digitalization projects goes beyond meeting traditional constraints. It also encompasses the aspect of learning.

In this context, learning should not be viewed as a mere by-product of projects but as a critical performance criterion. To capture the value of learning, it is essential to establish measurement criteria and actually measure performance in terms of learning from projects. This means organizations should proactively assess how well they are leveraging knowledge gained from previous projects to enhance future endeavors. It involves creating a culture of continuous learning and knowledge sharing, where the value of learning is recognized and prioritized alongside traditional project success metrics.

The paradox of transformation lies in the fact that while the urgency to transform is high, the benefits of transformation often unfold over an extended period (Jacobi & Brenner, 2018). Project leaders are confronted with the challenge of rapidly developing their team members' capabilities for learning, knowledge creation, and systems thinking within a limited timeframe (Cavaleri & Reed, 2008). This challenge also affects decision makers who typically prioritize projects that promise immediate return on investment and positive cash flows. However, in the context of digital transformation, this short-term perspective is insufficient, as it necessitates a longer-term view to ensure survival and competitiveness (Jacobi & Brenner, 2018).

Executives must regularly revisit, realign, and transform their digital solutions to remain agile and responsive to evolving customer demands. Experimentation is particularly crucial in the early stages of digital initiatives (Ross et al., 2019). Furthermore, the valuable insights gained during the transformation journey should be shared internally to foster organizational learning and continuous improvement (Ross et al., 2019). This knowledge-sharing process ensures that the organization remains adaptable and responsive in its digital transformation efforts. Digital transformation involves exploration; therefore, organizations should actively encourage experimentation rather than discouraging it. Consequently, organizations should seek ways to enhance employee capabilities to improve the outcomes of digitalization projects and facilitate success in their digital transformation journey.

5.2 RQ1: Exploring soft factors: Challenges impacting the implementation of digitalization projects

There was consensus in perceptions regarding the factors that pose challenges in digitalization projects, which fall into two categories. These challenges are related to the pace of changes in digital technologies and to management readiness. The primary origin of these challenges seems to stem from the dynamic and evolutionary nature of digitalization projects (Taylor, 2023). Each of these identified challenges is elaborated on below:

5.2.1 Challenges related to the pace of digital technologies

The dynamic and high volatility posed by digital technologies calls for a human resource development strategy that addresses this need. However, the process of developing the human resource is not an easy task. It requires strategies that clearly define the entire process clearly. As a start, organizations need a defined process of identifying what skills digital technologies require. Then training requirements need

to be developed, which translates differently for team members, managers, and top managers. This finding is in agreement with that of Fountaine et al. (2019) who emphasizes that the development of skills and expertise should not only be at individual level but inclusive of all people in all levels with matching the needs requirements at each level. When people's capabilities are increased and their ability to handle the change happening around their tasks increases, it minimizes the fear of the unknown that comes with digitalization. Henriette et al. (2015) discuss how changes influence how people perform their tasks, underscoring the need for new skills to facilitate digital transformation and mention the impact that human resources have on an organization, and how it needs to evolve with transformation.

While extensive research, such as that by Maedche (2016) and Weingarth et al. (2019), has highlighted the need for leaders in digitalization projects to possess distinct mindsets and skills, the focus has predominantly been on training for team members and project managers, addressing individual and project-level needs. Conversely, there is a notable research gap concerning the training requirements for senior managers at the organizational level. This oversight is significant, as the effectiveness of digital transformation initiatives often hinges on the leadership and strategic vision at the highest levels of an organization. Therefore, a comprehensive human resource development strategy must include a component that addresses the specific training needs of senior management, ensuring they are equipped to steer their organizations successfully through the complexities of digital transformation.

The unpredictability of digitalization project environments complicates planning at the project level, as required skills and expertise can change during implementation, often in ways not anticipated during the planning phase. Additionally, young employees now seek more than just employment; they value being appreciated in their organization, understanding the significance of their work, and how their job

contributes to their future career goals. This shift in expectations presents a challenge in retaining young talent, as they may be trained for specific tasks but choose to leave for other opportunities that align more closely with their aspirations.

Another challenge in this domain is the absence of effective knowledge-sharing mechanisms within organizations. Innovation thrives on acquiring, assimilating, transforming, and exploiting knowledge. Therefore, it is crucial for organizations to establish strategic systems that facilitate knowledge sharing at all levels, enabling the acquisition and dissemination of knowledge both internally and across organizational boundaries. Without such systems, knowledge often becomes confined to a few individuals or specific units, creating "silos". This restricts the development of new skills, thus limiting the full utilization of digital technologies and their potential opportunities.

5.2.2 Challenges related to lack of management readiness

The majority of challenges identified from a multi-level perspective are at the top management level. The findings indicate that these challenges primarily originate from a strategic standpoint, with a lack of preparedness for digitalization being a key issue. Many organizations have a limited understanding of what digitalization entails, making it difficult to define a clear vision for digital transformation. Consequently, strategies may be developed and implemented without a clear understanding of the reasons behind these changes. The vision and strategies need to emanate from the top-down; otherwise, defining them clearly at project and individual levels becomes challenging. Unclear visions can also foster fear, leading to organizational chaos. Kiron et al. (2016) highlight that a clear vision is crucial for aligning people, tasks, structures, and organizational culture, which are essential steps in facilitating the success of digitalization projects.

Developing a strong vision that fits in the digital agenda of the organization needs leaders who are well equipped to bring such vision to life (Snow et al., 2017), such that everyone in the organization is able to relate to the vision and goals (Sarantis et al., 2011). Top managers face challenges in translating digital innovation activities into a clear and positive business case for the company (Colli et al., 2022). Failure to link digitalization initiatives with the overall business objective hinders successful implementation.

Bureaucracy and organizational politics is another challenge that affects the implementation of digitalization projects. Our findings showed that having a big strategic gap between digital leaders and executives i.e., CEO is a hinderance for successful outcomes. The appointment and positioning of Chief Digital Officer (CDO) should not be taken lightly. Findings support that CDO be positioned just one position below CEO to enable direct access to the CEO. Reducing the gap between CEO and CDO enables dealing with politics, ensures timely response of concerns that arise from top level and promotes a sense of urgency of the VUCA world, which is what digitalization projects are undertaken in.

Cultural rigidity poses a significant challenge in digitalization projects. Organizations without a unified mindset can face managerial issues and hinder successful outcomes. Digital projects require collaboration with external entities, often perceived as unconventional partners. This external collaboration is crucial, especially since digital technologies are constantly evolving and required expertise may not be available in-house. Engaging with natural partners like research institutions or universities, as well as unconventional ones like freelancers, can be highly beneficial. Matt et al. (2015) emphasize that improved cooperation is key to digital transformation. A rigid culture can limit these opportunities and obstruct collaborative efforts. Adapting organizational culture is necessary to enhance employee productivity and embrace digital change (Morakanyane et al., 2017).

Communication-related issues also appeared to impact the success of digitalization projects. With digitalization projects involving teams that cross departments, adds diversity pertaining to skills, competences and expertise, and interactions, thus requiring heterogenous ways to communicate. Team members who belong to other departments may also need to respond to other tasks or the project manager may need to interact with their managers several times, leading to frustration and conflicts hence slowing down the communication process.

Another issue that emerged related to communication was inability to make timely communication of new regulations. As technologies are evolving faster, similarly, regulations are updated regularly. Thus, timely communication of new regulations is highly important to ensure it is incorporated as it comes. And for those cases where the teams transcends organizational boundaries, such environments were found to have a low sense of information security restricting 'what' and 'how' to share certain information, as employees would not be sure how much information is "too much" or how much is the "right" amount.

Understanding the contexts of end-users is crucial in digitalization projects. Recent research by Andersson et al. (2018) highlights a clear correlation between end-user orientation and the success of such projects. Our findings confirm that neglecting end-user needs is a major factor leading to unsuccessful digitalization outcomes. Top-level managers must balance the risks associated with exploring and exploiting firm resources and introducing changes that employees may resist. This perspective aligns with Schwab and Samans (2016) and Henriette et al. (2015), who also recognize that overlooking end-users can jeopardize the overall success of digital transformation. The deeper an organization delves into digital transformation processes, such as innovating and implementing new digital services or tools, the more imperative it becomes to thoroughly understand the end-users' contexts (Andersson et al., 2018).

An interesting insight from our research on the first question reveals that fear of change is more frequently cited at the top (organizational) and project levels than at the individual level. This suggests that top and middle management might overestimate the extent of individuals' fear regarding ongoing changes. Due to this perceived fear, they may withhold important information, concerned it could cause issues. However, this lack of transparency can lead to employees feeling excluded and frustrated, not understanding the reasons behind the changes. These insights suggest that top management could mitigate these issues by engaging in open discussions and sharing information about changes without fear of negative reception. At the individual level, there is a strong recognition that digitalization demands flexibility and adaptability. There is an acknowledgment that change is inevitable, and individuals are generally open and willing to adapt if changes are managed appropriately.

5.3 RQ2: Turning point: Ranking of soft factors rank in terms of their influence on the successful implementation of digitalization projects

The Pareto Principle, as coined by Juran (1954), emphasizes the importance of focusing on a few key items for effective improvement, planning, or control. Juran's concept asserts that significant outcomes are predominantly influenced by a vital few factors. The creation of factor lists is beneficial, but their utility is enhanced when they are ordered by importance (Juran, 1954). In line with this principle, this research question (RQ) sought to identify the critical soft factors significantly impacting digitalization project outcomes.

A systematic literature review of 35 papers on the subject revealed eight key factors deemed critical. These are: learning, organizational support, collaboration, organizational culture, involvement of end-users, organizational leadership, provision of training, and the soft skills of the project manager. Understanding and

prioritizing these factors can guide organizations in focusing their efforts where they are most likely to yield significant positive impacts on digitalization projects.

Project management involves the challenging task of simultaneously planning, organizing, and controlling numerous factors. Hence, concentrating on a few key factors and efficiently allocating resources can significantly increase the chances of success. Drucker (1996) observed that effective executives focus not on making numerous decisions but on making critical ones. For instance, an organization with a poor track record in digital transformation initiatives saw notable improvements in performance by focusing on just three aspects, as outlined by Bucy et al. (2016) These included investing in a transformation office led by a competent chief transformation officer, conducting weekly meetings, and implementing tools to monitor the progress and results of each initiative. This approach led to cost reduction, market trend improvements, and the development of new skills among its employees, fostering growth and resilience.

Therefore, understanding and identifying the most impactful issues is crucial. This knowledge enables practitioners to concentrate their efforts on a select few areas at a time, which can positively influence performance. This strategy of targeted focus aligns with the principle of prioritizing critical factors for maximum benefit.

Learning was found to be the most prominent success factor in digital transformation success, a detail not commonly emphasized in other discussions on key success factors. This advances our understanding of digitalization projects adding evidence to the differences that exist between digitalization projects and other types of projects. Correani et al. (2020) highlight in their study the neglection of *'information and knowledge'* and '*the need for data in value creation'* in previous literature on digital transformation and only received recognition recently.

Correani et al. (2020) identified eight crucial building blocks for successful digital transformation. These include: 1) clear scope definition, 2) management of internal

and external data, 3) establishing a data ecosystem, 4) defining new roles, tasks, positions, and capabilities, 5) identifying competencies and opportunities for acquiring new data from partners, 6) building AI capabilities, 7) implementing lean and agile processes, and 8) transforming activities, tasks, and services to focus on core activities, information, and knowledge. The majority of these building blocks are centered around capability development, and information and knowledge management, supporting our findings.

Li (2020) further supports the findings of this study, emphasizing that knowledge transfer and sharing are critical in enhancing the likelihood of successful outcomes in digital transformation projects. This underscores the importance of not only technical and operational aspects but also the strategic management of knowledge and capabilities within an organization.

5.3.1 Learning in digitalization projects

Digitalization project environments have been described as dynamic, uncertain, and volatile (Hafseld et al., 2021; Morakanyane et al., 2017), warranting a culture of continuous learning at all levels from individual to organizational levels. Such an environment calls for learning at different levels. At the organizational level, executives must learn to cultivate a change-oriented culture, including effective engagement in the digital transformation process. A key component of this is learning how to lead within the digital context, a skill that requires ongoing development.

At the project level, project managers are tasked not only with facilitating learning among team members but also with their own continuous education. The development of both technical and soft skills is crucial. However, these skills are not static; as digital technologies evolve (Morakanyane et al., 2017), means skills need a continuous updating.

At the individual level, learning needs are typically more apparent, as they directly relate to the tasks being performed. However, without effective mechanisms to evaluate employees' current skills and knowledge, planning for their learning needs becomes challenging. The importance of conducting learning evaluations is another key point emphasized in this thesis. Such evaluations should not be confined to the individual level; they are equally critical at higher organizational levels. In the dynamic and volatile environment of digital transformation, merely having a long-term strategy and executing it over an extended period is insufficient. Strategies must be regularly evaluated and recalibrated in response to ongoing learning and the emergence of new knowledge (Li, 2020).

Applying the newly gained knowledge could lead to better decision-making, optimize selection of skilled resources, better navigation among alternative courses of actions, better awareness of the changes that can be implemented thus increasing the likelihood of the project staying on track and achieving its goals. This effective use of new knowledge can also demonstrate to other stakeholders the organization's ability to adapt and innovate, further boosting stakeholder confidence and satisfaction with the project's progress and outcomes. On the other hand, the findings suggest that the ability to recognize and assimilate new knowledge has more influence on achieving the project's business success. This finding may suggest that spotting and understanding emerging trends, technologies, and market demands, can enable organizations to modify their strategies and processes accordingly, continually updating their knowledge base. In addition, access to up-to-date information enables organizations to make more informed decisions and identify more accurate or relevant business goals for their projects which are more feasible to achieve.

5.4 RQ3: Multi-level analysis: Strategies and approaches have proven most effective in overcoming challenges related to the implementation of the highest ranking soft factor in digitalization projects

This research question offers valuable insights into addressing challenges associated with learning in digitalization projects. By identifying factors that impede learning in the context of these projects, and proposing strategies to overcome them, the research conducts a multi-level analysis. It incorporates perspectives from all organizational levels, thereby presenting a holistic view. This comprehensive approach ensures that the strategies and insights cater to the unique needs and challenges at each level, from individual employees to top management. Such a thorough analysis is crucial for effectively tackling the learning obstacles that arise in the dynamic and complex environment of digitalization projects.

5.4.1 Hinderances of learning at the individual level

The findings highlight several factors that hinder learning at the individual level. Firstly, a competitive atmosphere among team members can lead to reluctance in sharing information. Individuals aiming to be seen as the "best" might withhold knowledge, hampering the collective learning spirit in the team and organization. In digitalization projects, where collaboration is key, internal competition is a hinderance as it impedes knowledge sharing and transfer, leading to knowledge silos within the organization.

The rapid changes in the context of digital transformation necessitate continuous knowledge updating by individuals in organizations, leading to a persistent knowledge gap. As digital technologies evolve, new skills and competencies are required to keep pace with these changes. Simultaneously, individuals must balance

their daily tasks with the need for ongoing learning and creating uncertainty regarding skill requirements.

Additionally, excessive workload with very close supervision can limit the opportunities for employees to engage in learning activities. Such an environment can create undue pressure and leave little room for exploration and skill development, essential for innovation in digital transformation projects.

The lack of individual performance appraisals can hinder learning as facing learning expectations and objectives challenges employees to learn and innovate. Performance appraisals are important for evaluating and understanding how and where employees contribute to the overall organizational performance. These appraisals provide insights into employee progress and learning needs, crucial for continuous improvement and alignment with organizational goals in the dynamic field of digital transformation.

Impaired understanding of the outcome also was found to hinder learning. If individuals are not informed about project objectives and the reasons for implementing changes, it can negatively affect their tasks and the project outcomes. Managing projects in an environment with unclear or “blurry” information adds an additional dynamic that increases uncertainty to the project tasks, thus adding difficulty to learning.

5.4.2 Hinderances to learning at project level

This dynamic work environment demands high flexibility and adaptability from individuals, including the ability to move between teams based on project needs and expertise, and to work from various locations, including with external collaborators. In an environment that requires high flexibility, it can be difficult to keep up with the project tasks and engage in learning concurrently as both require time and changes are also happening, which means there is a lot of knowledge that needs to be acquired and shared. Organizations risk obsolescence if they are slow to adapt to

technological changes or are too rigid in their methods. The challenge lies in staying up-to-date with changes in a digitalized environment.

Project managers are faced with the challenge of planning for resources upfront. And because of its exploratory nature, it is challenging to have all the information early on. In addition, digitalization projects often require the mixing of people cross-cutting several units i.e., technical and business departments whose time may also be committed to other projects or tasks. Thus making it complex to plan for people with the right skills upfront and in a timely manner. Furthermore, the people may not have enough time to engage in learning new skills or sharing their own skills with others due to involvement in other projects.

5.4.3 Hinderances of learning at the organizational level

The inability to clearly define all the value, impact, and risks of a project on organizational processes upfront can hinder learning at an organizational level. When the reasons for digitalization changes are not made clear, employees may struggle to fully engage, for instance, by being open and willing to learn, acquire new skills, and share knowledge with others, due to uncertainty about their future in the company.

Obstructive management approach. Certain leadership or management styles can impede learning and innovation. For instance, leaders who take credit for their subordinates' work can demotivate their team. Moreover, some leaders may not encourage continuous learning among employees due to concerns about them leaving for better opportunities. This approach not only risks losing more knowledgeable employees but also overlooks the potential value they could bring.

Result-oriented rather than growth-oriented vision. Prioritizing results over employee growth can also lead to a lack of motivation for learning and innovation, as team members might only focus on meeting expectations without seeking further learning opportunities.

5.4.4 Strategies to effectively address challenges related to learning in digitalization projects

5.4.4.1 Individual level

Two effective strategies at the individual level for overcoming challenges in digitalization projects are identified: (i) promoting individual knowledge development, and (ii) implementing personalized learning journeys. Encouraging individuals to participate in external events enables them to acquire new knowledge from peers in similar projects and bring that knowledge back to their organization. There should be time allocated for engaging in three key activities for individuals: learning new information, sharing existing knowledge, and applying this knowledge in their day-to-day tasks.

Personalized learning experiences focus on customizing learning to individual needs, interests, and styles, moving away from one-size-fits-all training programs. This strategy involves giving individuals the autonomy to choose projects that match their interests and areas where they can contribute most effectively, as well as the flexibility to seek training in specific areas where they see a need and opportunity for value addition.

5.4.4.2 Project level

Five key strategies have been identified as effective in tackling challenges in digitalization projects at the project level: (i) encouraging sharing of lessons learned, (ii) promoting cross-team and functional exposure, (iii) active coaching and mentoring, (iv) continuous identification of knowledge gaps, and (v) embracing challenges.

- Sharing lessons learned: Post-project reviews are vital. Rather than just storing these insights, actively sharing, and discussing them with the team can highlight successful practices and areas for improvement.

- Cross-team exposure: This approach ensures a steady flow of learning opportunities and mitigates the risk of over-reliance on a limited number of experts, preventing resource constraints.
- Active coaching and mentoring: This strategy fosters strong social connections and trust within the team. Implementing 'learning buddies' can reduce the workload on project leaders and ease conflict resolution, especially for newcomers.
- Identifying knowledge gaps: Continuously recognizing and addressing knowledge gaps allows project managers to proactively plan for skill development and knowledge acquisition.
- Embracing challenges: Strategically placing employees in demanding situations, such as assigning challenging tasks, not only enhances learning but also helps them adapt to uncertain and challenging environments.

5.4.4.3 Organizational level

Four key strategies have been identified as effective at the organizational level for overcoming challenges in digitalization projects: (i) embracing external collaborations, (ii) establishing an inclusive mindset, (iii) creating safe learning spaces, and (iv) strategically prioritizing change initiatives.

- Embracing external collaborations: This strategy highlights the value of engaging with field experts and acquiring external knowledge. This often involves reaching out beyond the organization to bring in fresh expertise and perspectives.
- Establishing an inclusive mindset: Openness within the organization builds trust and values employee contributions. This includes fostering dialogues between management, external stakeholders, and internal teams to stay informed about technological trends and market dynamics.

- Creating safe learning spaces: Encouraging open and transparent internal discussions creates a secure environment for idea sharing and collaborative problem-solving.
- Strategically prioritizing change initiatives: Management should actively participate in external events to gain insights into technological advancements. Allocating time and resources for learning and careful assessment of change initiatives ensures effective implementation and resource utilization. Prioritizing key initiatives allows the organization to focus on urgent challenges and opportunities for growth.

As we have shown that challenges at each level are different, thus addressing issues and concerns at each level would need to be distinguished to enable proper resource distribution and maximize outcomes. We propose that organizations follow the suggested recommendations for each level as shown in the integrated framework of this thesis in Figure 5-1.

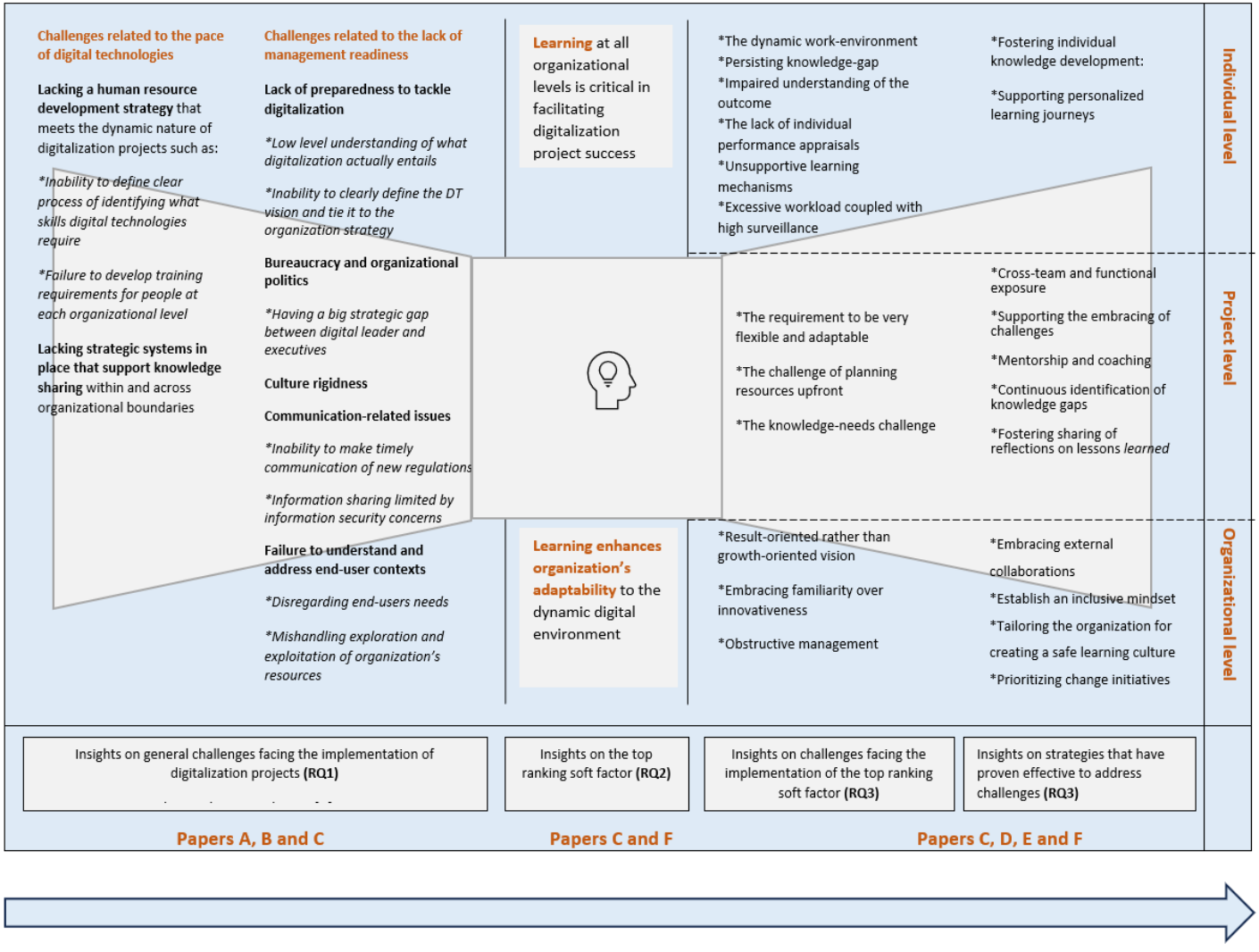

Figure 5-1: An integrated framework of the thesis

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6 Conclusion

This chapter concludes the thesis by summarizing the main findings, outlining the theoretical and practical contributions, and suggesting directions for future research. The conclusions are drawn from each research question, and the contributions are structured according to the three phases of the thesis research design.

The thesis aimed to offer deeper insights into enhancing digitalization project outcomes by exploring and analyzing soft factors. It employed a dual-funnel approach: beginning with a broad exploration of soft factors (phase I), then narrowing down to a single top-ranking factor for more focused analysis (phase II). Phase III, the main study, delved deeper into the role of one factor (learning) at different organizational levels and their interrelationships, leading to the understanding that soft factors are layered and integrated within organizations.

The thesis was guided by three research questions, which are provided below with their conclusions.

6.1 Answering the research questions

6.1.1 RQ1: What are the challenges that organizations face in implementing digitalization projects?

This RQ is addressed in **Papers A, B, and C**. The challenges facing the implementation of digitalization projects were found to fall into two categories; challenges related to the volatile and dynamic nature of digital technologies and challenges related to managerial aspects. These are summarized in Table 6-1 below:

Table 6-1: Challenges facing the implementation of digitalization projects

Challenges facing the implementation of digitalization projects	
The pace of digital technologies	○ Lacking a human resource development strategy that meets the dynamic nature of digitalization projects such as: • *Inability to define clear process of identifying what skills digital technologies require* • *Failure to develop training requirements for people at each organizational level* ○ Lacking strategic systems in place that support knowledge sharing within and across organizational boundaries
Lack of management readiness	○ Lack of preparedness to tackle digitalization • *low level understanding of what digitalization actually entails* • *Inability to clearly define the DT vision and tie it to the organization strategy* ○ Bureaucracy and organizational politics • *having a big strategic gap between digital leader and executives which hinders timely response of concerns* ○ Culture rigidness which limits access to such opportunities and impede collaboration opportunities ○ Communication-related issues • *Inability to make timely communication of new regulations* • *Information sharing limited by information security concerns in collaborations transcending organizational boundaries.* ○ *Failure to understand and address end-user contexts* • Disregarding end-users needs • Inability to handle exploration and exploitation of organization's resources • Employee resistance to change due to improper change management

6.1.2 RQ2: How do different soft factors rank in terms of their influence on the successful implementation of digitalization projects?

This research question is addressed in **Papers C and F**. A total of eight factors were identified to be critical in the digitalization context, with learning found to be more critical in the digitalization context. These are: learning, organizational support, collaboration, organizational culture, involvement of end-users, organizational leadership, provision of training and soft skills of the project manager. The thesis then delved deeper into exploring learning, using the absorptive capacity construct. It examined how an organization's ability to adapt to volatile and dynamic environments is closely linked to the success of digitalization projects. This link is found to be strengthened by the implementation of appropriate learning mechanisms. This insight emphasizes the crucial role of learning in enhancing the overall success in digital transformation efforts.

6.1.3 RQ3: What strategies and approaches have proven most effective in overcoming challenges related to the implementation of the highest ranking soft factor in digitalization projects?

This research question is explored in **Papers D, E and F** with additional insights from **Paper C**. It identifies a total of 10 factors that hinder the implementation of learning mechanisms in organizations, distributed across three levels. Specifically, 5 factors pertain to the individual level, 2 to the project level, and 3 to the organizational level. Additionally, 11 strategies to tackle these challenges were identified, each corresponding to the respective levels: 2 strategies target individual level challenges, 5 focus on project level challenges, and 4 aim at organizational level challenges. These factors and their corresponding strategies are comprehensively outlined in Table 6-2 below.

Table 6-2: Addressing challenges related to the implementation of the highest ranking soft factor in digitalization projects

Organizational level	**Digitalization projects**	
	Challenges	**Strategies to address the challenges**
Individual	*-Persisting knowledge-gap* *-Dynamic work-environment* *-Impaired understanding of the outcome* *-Work overload* *-Lack of individual performance appraisals*	*-Fostering individual knowledge development* *-The use of personalized learning journeys*
Project	*-The requirement to be very flexible and adaptable* *-Challenge of planning resources upfront*	*-Through cross-team and functional exposure* *-Embracing challenges* *-Mentorship and coaching* *-Continuous identification of knowledge gaps* *-Fostering sharing of reflections on lessons-learned*
Organizational	*-Inability to clearly define all the value, impact, and risks of a project on organizational processes upfront.* *-Obstructive management approach.* *-Result-oriented rather than growth-oriented vision*	*-Embracing external collaborations* *-Establishing an inclusive mind-set* *-Tailoring safe learning spaces* *-Prioritizing change initiatives*

6.2 Thesis contributions

6.2.1 Phase I: Exploratory phase

6.2.1.1 Theoretical contributions

Findings from this phase provide two important contributions. It advances our understanding of the role of soft factors in the context of digital transformation by conceptualizing the interconnectedness of soft factors. This phase depicts how success factors influence each other through two frameworks. The framework presented in Paper A deepens our understanding of the relationships between success factors. It identifies which factors form the basis for others and which are embedded within others. Moreover, it incorporates perspectives from all three organizational levels - individual, project, and organization - highlighting the cross-level interrelationships between factors. The framework shows the relationship between strategic leaders (CDOs), decision makers i.e., organizational level and employees at the individual level implying that the boundaries between these levels should be permeable. The framework in Paper B advances the discussion of the pillars of DPs (i.e., digital technology, organizing and value). It maps out the success factors that can enhance the management of each pillar and identifies those at the core intersection, facilitating a comprehensive approach to addressing them. This multifaceted perspective provides a richer understanding of how to effectively manage and leverage soft factors in the context of digital transformation.

6.2.1.2 Practical contributions

This phase highlights the significant interconnectedness of soft factors in organizational contexts, underscoring that organizations should not selectively implement these factors. Instead, they should be viewed holistically and implemented in unison for optimal effectiveness. However, in situations where prioritization is necessary, the findings from the two frameworks presented in Phase I offer guidance on identifying foundational factors that require more attention.

6.2.2 Phase II: Turning point

6.2.2.1 Theoretical contributions

Findings from this phase contributes to existing research by providing a comprehensive overview of soft factors in digitalization projects. To the best of our knowledge, this is the first systematic literature review that expounds the extent of available knowledge of soft factors in the digitalization context and contrasts them at different organizational levels. A framework in Paper C advances our understanding of challenges and how they can be addressed during implementation and adoption phases. The implementation phase has been found to be the phase with the most challenges and where most of the value is lost, thus insights contributing to the understanding is highly significant.

Additionally, from a theoretical perspective, learning emerged as one of the highest-ranking critical soft factors. This revelation emphasizes the significance of continuous learning and adaptability within the rapidly evolving landscape of digital transformation, highlighting its crucial role in the success of digitalization initiatives.

6.2.2.2 Practical contributions

The findings from this phase provide valuable insights for practitioners in organizations, directing their focus to critical soft factors and their relevance at different organizational levels. Unlike existing research papers on the successful implementation and adoption of digitalization projects, which often do not differentiate between adoption and implementation or categorize these processes at organizational, project, and individual levels, this research offers a novel approach.

Our categorization serves as a crucial framework for practitioners, enabling them to identify which tasks need attention but also at what level they need attention in the organizational structure. Knowing the relevant tasks will enable the identification of relevant skills needed to accomplish such tasks at each respective level. Such

targeted identification of skills ensures that the right competencies are developed or acquired at the right organizational level, enhancing the overall effectiveness and success of digitalization initiatives.

6.2.3 Phase III: Main study

6.2.3.1 Theoretical contributions

This phase provides three contributions.

(i) Highlights a new perspective on learning in digitalization context

It brings a different perspective on learning by highlighting the pre-conditions that support learning for innovation. factors. It goes beyond merely identifying these preconditions, underscoring the importance of organizations actively evaluating whether their employees are effectively learning once these conditions are met. This approach offers a more dynamic and actionable perspective on organizational learning.

(ii) Emphasizes on management-related factors in learning culture

Despite the widespread recognition in existing studies of the importance of management-related factors in creating a learning culture, there is a lack of empirical evidence regarding the extent to which organizations actually focus on these factors. This research addresses this gap, providing valuable information for both academic research and practical application. It highlights the need for more empirical investigation into how organizations prioritize and implement management practices that foster a conducive learning environment.

(iii) Contributions to learning in the context of digitalization projects

- Provides empirical evidence on factors that add uncertainty to digitalization project environments and how to effectively manage this uncertainty at various organizational levels.

- Confirms the need for organizations to focus on developing their absorptive capacity, including employee training, knowledge management systems, and partnerships with external entities, to effectively acquire, assimilate, and apply new knowledge in digitalization projects.
- Highlights the vital role of employees in developing an organization's absorptive capacity, emphasizing the importance of empowering employees to acquire and apply new knowledge, thus fostering a more engaged and satisfied workforce that positively impacts digitalization project success.

6.2.3.2 Practical contributions

Findings indicate that digitalization projects, characterized by constant change, require ongoing learning and innovation for competitive advantage. It is crucial to not only identify and rank critical factors but also to conduct evaluations to pinpoint organizational loopholes for strategic management. Additionally, the findings provide multi-level guidance, integrating individual, project, and organizational perspectives. Practitioners can use this framework to understand the sources of uncertainty in digitalization projects, where they occur organizationally, and how to address them effectively. Paper F further enhances our understanding of how absorptive capacity helps organizations identify necessary knowledge and skills for adapting to environmental changes. Developing these capabilities can increase organizational agility and responsiveness, improving digitalization project success.

6.3 Future Studies Recommendations

Research on the management of digitalization projects remains limited. Key areas for future research include:

- Developing a universal definition: There is a need for a universal definition of digitalization projects within business and management contexts. Marnewick and Marnewick (2022) encourage project management researchers to lead this effort to prevent other disciplines from dominating the research agenda.
- Exploring other dimensions: While this thesis contributes to understanding digitalization projects from a people perspective, there are opportunities to study these projects from technological and process dimensions.
- Investigating other critical soft factors: Beyond learning, which was the focus of this thesis, other soft factors that ranked high in impacting digitalization project outcomes were identified. Future research can investigate the challenges in implementing these factors and their influence on digitalization project performance.
- Expanding to digitalization program management: This thesis examines digitalization projects in an individual project context. Future studies could replicate and expand this approach to provide empirical evidence focusing on digitalization program management.
- Inter-organizational learning and absorptive capacity: This thesis focused on organizational learning and absorptive capacity at an individual, project and organizational level. Given that digitalization projects involve inter-organizational interactions and collaborations, future studies could explore learning and absorptive capacity from an inter-organizational perspective, extending beyond the organizational lens.

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Appendices

A-1 Questionnaire used for Paper F

PART A: Demographic information **Age:** **Position or Current role in the organization:** **Experience:**	
Information about the organization	Please indicate the degree of your support for the following statements. ***Please use a scale from 1-5 where 1=Strongly disagree, 2= Disagree, 3= Neither agree nor disagree; 4= Agree; 5= Strongly agree.*** My organization is initiating efforts to undergo digital transformation (ORG1) In the last three years, my organization has accomplished one or more successful digitalization projects for our clients (ORG2) In the last three years, my organization has accomplished one or more successful digitalization projects internally (ORG3) Over the past three years, there has been an increase in the pace of adopting digitalization initiatives within our organization or among our clients (ORG4)
PART B: **Please indicate the degree of your support for the following statements. Please use a scale from** *1-5 where 1=Strongly disagree, 2= Disagree, 3= Neither agree nor disagree; 4= Agree; 5= Strongly agree.*	
Factor 1: Organizational environment	1. When it comes to digitalization changes that align with our business objectives, I would characterize my organization as highly adaptable (ENV1) 2. In terms of meeting new technological requirements, I would say that my organization is adept at adapting (ENV2) 3. My organization is skilled at adapting to acquire new skills and competencies in the context of digital transformation (ENV3) 4. My organization is capable of adapting to meet market expectations effectively (ENV4) 5. My organization is proficient in adapting to incorporate new digitalization regulations and standards (ENV5)
Factor 2: Absorptive Capacity	***Acquisition*** 1. My organization allocates both finances and time for us to engage in acquiring new knowledge (ACQ1) 2. My organization creates a safe space/ environment where I can share my ideas, develop scenarios and search for solutions together with my colleagues (ACQ2) 3. My organization supports collaboration with experts from other industries i.e., academic institutions or other organizations (ACQ3) 4. My organization keeps us with digital trends by sending employees to attend fairs (ACQ4) ***Assimilation*** 5. We have a culture of collecting lessons learnt from completed projects and sharing the experiences (ASM1). 6. I have access to a learning buddy or mentor who helps me with any work-related queries or uncertainties (ASM2)

	7. My organization is receptive to my needs for developing additional skills and competencies to carry out tasks effectively (ASM3) 8. My manager is available for frequent meetings with me as per my requirements (ASM4) 9. My organization encourages attending conferences and seminars that offer learning opportunities about other organizations (ASM5) 10. My organization offers essential training programs to equip individuals with the skills needed to perform their tasks proficiently (ASM6) ***Transformation*** 11. My organization promotes knowledge transfer by moving people between projects (TRA1) 12. My organization remains vigilant about emerging digital technologies and ensures that we update our knowledge base to stay current (TRA2) My organization does not implement many new changes at the same time (TRA3) 13. My organization recruits personnel with specific technology experience to facilitate knowledge sharing (TRA4) ***Exploitation*** 6. My organization collaborates with experts from various industries, including academic institutions and other organizations to generate new knowledge (EXP1) 7. My organization supports experimentation of new solutions (EXP2).
Factor 3: Project success	***Project plan success (short term)*** 1. The project was completed within the allocated time/schedule (PPS1) 2. The project met its planned scope (PPS2) 3. The project was completed within the allocated budget/cost (PPS3) ***Business case success (medium-term)*** 4. The targeted benefits were achieved after project completion e.g., financial or productivity benefits (BCS1) ***Green efficacy sustainability-(long-term)*** 5. The society was positively impacted by the project outcomes i.e., it had benefits beyond the organization (GES1) ***Stakeholder perceptions*** 6. Employees were satisfied with the project outcome and easily accepted the changes that occurred (STS1) 7. The customers were satisfied with the project outcome (STS2) 8. Top management/ executives were satisfied with the project outcome (STS3) 9. The project manager was satisfied with the project outcome (STS4)

A-2 Questionnaire used for Paper B

PART I	
1.What project group were you in? 2.What did your group produce for the project assignment?	Member background information
PART II	
1. What would you say are most important success factors of digitalization projects? 2. What would you say are the challenges experienced in the management of digitalization projects? 3. What would you say are the measures needed to deal with such challenges? 4. What would you say are the most important lessons learnt from the project assignment?	Open-ended questions
PART III	
1.The project assignment provided me with an authentic project management experience. 2.The assignment helped me to see the triple-tasks in digitalization projects (organizing the effort, creating an impact, and using technological aids)	5 point Likert-scale

A-3 Questionnaire used for Papers D and E

Survey outline	
Section I: Demographics	**Question**
• Age range • Industry • Current position/role	Multiple choice Open-ended Multiple choice
Section II: Respondent's perception on Learning in Digitalization projects	
• In your own words, what does it mean to learn? • In your own experience, how do you prefer to learn in your organization? • In your work environment, what factors do you feel enable you to learn better? (You can answer one or more factors) • In your work environment, what factors do you feel hinder your learning? (You can answer one or more factors) • What would you say is the immediate impact that makes you realize that you have learnt?	Open-ended Open-ended Open-ended Open-ended Open-ended
Section III: Considering the digitalization context, rate the importance of the provided factors in supporting the creation and acquisition of new knowledge?	
• I am eager and willing to discuss and debate with my fellow colleagues and share with them my knowledge • I am eager to acquire new knowledge (willingness to learn) • I have open-minded attitude, willing to adapt and change and not stuck to old ideas I am not afraid to ask for help or to admit that I need help in solving my organizational tasks. • The senior management encourages us to share and debate and use time on exchange new knowledge • Senior management encourages us to search for knowledge outside the boundary of the organization (for example by covering costs associated with attending internal or external programs) • Senior management encourages establishing inclusive work environment. We all feel that we care about each other • The senior management is available when I want to discuss my tasks in the organization • People involved in task are co-located i.e., within reach to each other No one is punished for making mistakes during the execution of their task • There are a lot of experienced people in my organization that knows a lot	Likert scale (1-10)

A-4 Interview guide

Interview Guide
A: Brief introduction 1. What is your role/ position in the organization? 2. How long have you been working in projects? 3. What industries have you worked in in your career? 4. What is your experience working with digitalization projects or digital transformation in general.
B: Based on your experience, having managed/ led digitalization projects: 1. What would you say are the important characteristics of digitalization projects that makes them different from other projects, example IT projects? 2. Can you give examples of such projects? 3. What would you say are the challenges with managing such projects? 4. How would you say acquisition of knowledge (learning) is important for the success of these type of projects? Why? 5. How do you see is the best way for your organization or organizations in general to support learning (example learning from experiences, from other projects etc.) for its employees considering drastic changes that comes with digitalization?
C: About skills and competence management in the digital transformation era: 1. How does your organizations identify the need for trainings? 2. How does your organization assess the skills of existing staff and mismatches between team members and project requirements? 3. How is the organizing and executing trainings to impart skills and competencies relevant for digital transformation?

PART II: PAPERS

PAPER A

A Retrospective Analysis of the Role of Soft Factors in Digitalization Projects: Based on a Case Study in a Public Health Organization in Trondheim-Norway

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A Retrospective Analysis of the Role of Soft Factors in Digitalization Projects: Based on a Case Study in a Public Health Organization in Trondheim-Norway

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***Abstract*—There is a common consensus in project management literature that managing the soft factors in digitalisation projects is a critical success factor. It is also suggested that enabling the digital transformation in organisations requires addressing carefully various forms of soft factors. The objective of the paper was to build on the current body of knowledge regarding the role of soft factors in digital transformation and to identify and present a retrospective analysis of the soft factors that have contributed to challenges of a major digitalisation project in the health sector in Trondheim-Norway. The major finding from the case study suggest that although commitment by top-management is a critical factor to drive and implement digital transformation, this commitment alone might be counterproductive if it is not balanced with other critical factors such as thorough understanding of the impact of the project on the workload and work process of various end-users of the system. The findings further showed that commitment is also counterproductive if not balanced with the ability to respond and act upon concerns emanating from the end-users. Finally, the study proposed a framework to enable the understanding of the interconnection between various soft factors in digitalisation projects and the impact of this interconnectivity.**

Keywords—digitalisation, case study, soft factors, lessons learned, public projects, digital transformation

I. INTRODUCTION

To remain relevant, productive, efficient, effective and financially viable in the digitally transforming business environment, organisations are taking various initiatives to digitalise their processes. Businesses are at a point in time where the only choice they have is to digitalise or drown [1]. The journey towards digital transformation requires the adoption of digital technologies which in turn impacts the "business as usual" strategy. This then impacts significantly the organisation itself [2] including the people in the organisation (employees) who are the end-users of the digitalisation project output.

The terms ' digitalisation' and 'digital transformation' have been used interchangeably by various researchers resulting in lack of clarity [2]. Digital transformation is the changes digital technologies can bring about in a company's business model, which result in changed products or organisational structures or the automation of processes [3]. The main purpose of digital transformation is to redesign the organisational business through the introduction of digital technologies, achieving benefits such as productivity improvements, cost reductions and innovation [4]. However, Wisboeck attempted to distinguish these terms by defining digitalisation as "*the adoption, adaption, development, and management of innovative digital technologies within organisations, including the process of digitising"* [5].

The public health sector is facing the challenge of having to deliver more with less without compromising the quality of services. This constitutes a strong requirement for a high degree of innovation and digitalisation within the sector. There is a growing interest in digitalisation in the health care sector, as there has been significant research increasing the digitalisation of healthcare over the past years [6]. It is expected that the digital transformation of the health care sector will be as disruptive as it has been already in other industries [7]. The public health care systems, being in Norway and the rest of the world, are facing major challenges with rising costs, increasing demand for provision of care in ageing societies, and outcome problems [8, 9]. Studies are revealing that digital technology might mitigate or even eliminate these challenges, and thus improving health care delivery [7].

A. Motivation

Digital transformation disrupts the ways of working and collaborating 'in' and 'between' organisations [2]. Extant studies have attempted to cover the general success factors for both digitalisation projects and IT projects. However, it is not sufficient to only focus on the successful introduction of such projects, and it is of great significance to ensure that that their impact to the end-users and organisation as a whole are understood and addressed considering that such projects are disruptive and expensive to implement. To digitally transform successfully, it is important to take the entire workforce-through the digital journey [10].

This study aims to bridge the gap by analysing the role of soft factors in digitalisation projects. This will cover a two-way relationship between people and digitalisation projects with the attempt to understand how end-users can impact the success and longevity of digitalisation projects and how they can be impacted by digitalisation projects. The authors acknowledge the existence of vast research on IT projects, but for this study, only digitalisation projects are considered.

In this paper, we are taking a retrospective view on a completed digitalisation project. The project is described in

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Hussein [11] and was completed in 2012 in a regional hospital in Norway and the purpose of the project was to introduce speech recognition software in order to eliminate the use of medical secretaries as well as streamlining patient management at the hospital. Excerpt from the case is shown in Fig.1. We shall use this case-study to examine various aspects of soft factors that have been overlooked during project development and implementations, and may have influenced the end-user's perception of the project. We use the case as well in order to highlight the conception of risk-taking in digitalisation projects and how this concept of risk-taking has been a driving force and have not been balanced with an understanding of the long-term impact on the end-users.

II. Literature Review

A. Soft Factors

An increasing trend has been observed over the past three decades in research related to soft factors as opposed to solely based on the traditional aspects of project management. There is a need to reassess the current changes with regards to soft factors and infuse them with management tactics which require decision-makers in organisations to have a proper understanding of what these factors entail and of their contribution towards overall performance [12]. Some extant research has identified the importance of organisational, political, and human-related issues, and even found these to be more important than technical issues in facilitating project success [13-16]. It is imperative to note that the role of soft factors in determining project and operational success has not lessened with the escalation of digitalisation. Soft factors are termed as 'hidden' because they are invisible, immeasurable, and because they are not defined as assigned tasks are, they are likewise easily neglected [17]. The terms 'soft factors' and 'human factors' are often used interchangeably. Human factors are defined as "*physical and psychological capabilities of the individual, like training, education and experience"* [18] whereas soft factors are defined as "*behavioural aspects of management or human factors*" [19]. For this study, we adopt this definition.

B. Soft Factors in Digitalization Projects

A significant number of studies have identified various success factors in digitalisation and digital transformation initiatives. Although the studies cover a range of business organisations and public sectors, there is a significant correlation between most of the factors, which is an indication that these factors apply to most types of organisations. A study on cultural ethics in digitalisation revealed that collaboration and communication are among the factors with high significance in ensuring successful digitalisation initiatives within the organisation.

They propose that the organisation should make use of available forms of communication such as group meetings, formal meetings, seminars, conferences, within groups, cross between groups, domestic, and international to facilitate communication. Constant collaboration should be a priority between all members involved in the project. The authors also point out the possibilities of disputes to occur in case of cultural clashes between collaborating members and the need to create awareness in order to successfully manage these disputes [20]. Studies [21], [22] and [23] support this finding that collaboration is a significant success factor in digitalisation projects. A study by Scott also supports that proper communication from management to an employee is of great significance [24].

Strategic leadership was also found to be a significant success factor. Digitalisation requires the adoption of new technologies and capabilities, and it also requires new kinds of leadership, management, organisation structures and modified working processes [25]. This is supported in [23] where it is stated that having strong leadership is the first step towards achieving success of digitalisation initiatives. In [10], the author points out that a digitally transforming organisation needs a digital leader whose goal is to lead digitalisation. He further highlights the qualities of the digital leader as; work in team effort/unity, ability to drive-change, risk-taker, ability to inspire, ability to drive a shared ambition and should possess technical capabilities. This effort to have a designed digital leader in the organisation is supported in [26] and [27] where the authors refer to these leaders as chief digital officers (CDO).

Top management support has also recognised as another significant success factor in digitalisation projects. It is postulated that the support from higher levels in the organisation is paramount [28]. The top management has been identified as enablers of digitalisation as they are responsible for addressing employee demands and communicating the changes so that employees identify with the goals of the digital transformation and recognise the benefit for themselves and in their perspectives [29]. Likewise, as stated in [24], it is the work of top management to communicate the new vision to prepare employees for the change and to provide support in terms of resources and required training.

Employee involvement is another significant success factor for digitalisation projects. Involving employees in changing processes is immanent for the later success of adoption of digitalisation; therefore, understanding their perceptions, experiences and attitudes towards digital technology is crucial [28]. Since work dimensions are changed as a result of digitalisation, it requires employees to be assistive, intuitive, connected and adaptive. This results in the need for workplace improvement, which is identified in [28] as a *transformation driver*. Workplace improvement can be in terms of incentive systems that reward risk-taking and agile development processes [23].

Digital transformation can only be successful if the technology and process changes are accepted by the end-users [29]. Therefore, it is crucial to evaluate and address

Regional Hospital H was facing major economic challenges and had to reduce spending on salaries. Several initiatives were suggested. One of these initiatives was introducing speech recognition software. By using this type of software, a doctor can 'talk' to a computer and his or her speech will be converted into written form in the electronic patient record (EPR) system. Previously, the doctors had audiotaped their notes relating to their patients, and then secretaries had transcribed the notes into the hospital's records. The objective was to introduce the speech recognition software without causing any increase in the doctors' time spent on documentation. It was assumed that doctors who used speech recognition software would spend longer on dictations, but would not subsequently check and approve the records. With the speech recognition system, all activities were to be carried out there and then, and the record would be approved immediately. All doctors took a three-day course, and after that, in principle, all records that hitherto had been dictated by them and then transcribed by secretaries would immediately become accessible in text format. The hospital's management had already estimated that a significant number of secretary work years could be saved. A central typing service was created, and it was planned that the transcription of any remaining dictations was to be done there. This would streamline the typing process and simultaneously be an outcome measure of how well the speech recognition system had been implemented.

Dictation errors

The time doctors spent on managing their records on paper before the introduction of the system was estimated at 4.5 hours per week on average. During the pilot study of the speech recognition software, the time spent on records management, including checking them, was estimated as zero. This proved to be an inaccurate estimate. When the secretaries transcribed records, they sometimes discovered errors that needed to be checked by the doctor concerned, but such errors were generally easy to spot, and usually, it was possible to understand what the doctor had intended to say, despite the errors. The introduction of the speech recognition system led to the emergence of entirely new errors that often could change the meaning of the text completely. Such errors proved to be difficult to discover during proofreading since the software spelt all words correctly, and the sentence structure seemed plausible. The doctors considered the errors very unfortunate and potentially risk-filled, and therefore they had to spend an inordinate amount of time on checking their patients' records. Extra time was not set aside in connection with the implementation of the system, and the doctors still had only 20 minutes per patient, which included maintenance of their records and correcting their notes.

Consequently, many doctors stopped using the software. However, secretarial staff continued to be downsized, and doctors were more or less forbidden to return to dictaphones. By the time the doctors had discovered that they were only able to use the system to a limited extent compared with what had been planned, the damage had already been done – the secretaries had left. There had been early warnings from the doctors that the use of the speech recognition software could result in the risk errors. This feedback on the project was not considered and instead explained as due to technical problems and inadequate training. Risk and vulnerability (RAV) analyses were carried out, but the results were only considered to a small extent. Better communication with the 'end-users' could have helped to identify the problems clearly in the early stages so that mitigation measures could have been taken, and possibly the project might have been reconsidered. Although the project reduced the numbers of employees as required, an unforeseen consequence was that the hospital's doctors had to type more than half of all patient records. Hence, they had considerably more administrative tasks relating to patient care. This was an unintended and negative result of the project, which contributed to reduced efficiency in the 'production' process, which was

Fig.1. Excerpts from a real-life project case: Introducing speech recognition software. (Hussein, 2018 pp 195-201)

Employee acceptance of the changes brought about by digitalisation. Qualifications of employees also need to be revised and evaluated so that specific training packages can be formulated to develop digital competence [30]. Competence has also been identified as one of the core success factors for digitalisation [22]. Training and re-training is another factor with significance in order to facilitate digitalisation as it facilitates readiness [24] and acceptance of the end-user. Organisations also need to acknowledge that digitalisation changes the workplace conditions resulting in the need for new skills and competency requirements that are not only limited to the use of technology. Decision-makers in the organisation, therefore, need to design sufficient supporting structures that help people to develop their work practices and self-management skills [31]. A summary of the soft factors identified is presented in Table I.

TABLE I. SOFT FACTORS IN DIGITALISATION PROJECTS

Soft Factors in Digitalization Projects	References
Collaboration	[20], [21], [22], [23]
Communication	[20], [24]
Strategic leadership (Digital leader)	[10], [23], [25], [26], [27]
Top management support	[24], [28], [29]
Employee involvement	[23], [28]
End-user acceptance	[24], [29]
Training and re-training	[24], [30]
Competence	[22], [30], [31]
Rewards and incentives	[23[, [31]

C. Risk-taking in Digitalization Projects

There are several risks connected to the dynamics of digital transformation projects. If these risks are not managed in a proper way, the projects will most likely fail to create value for the organisation [32]. Organisations need to understand that digital transformation and digitalisation projects are not add-ons, but the very essence of the transformation journey needed if they want to remain relevant in the game [33]. Digital transformation is a journey that involves a change in leadership, in organisational models as well as increased use of technology to improve the end-users' experience [32]. To meet these challenges, top-level managers need to transform their organisational routines and structures. Even though organisational change is by no means a new topic, several organisations struggle to recognise and make sense of the often very disruptive changes affecting them [3]. Managers must take into account that they have to balance several risks simultaneously. They must handle the risk of exploration and exploitation of their firms' resources as well as handle the risk of introducing changes that the employees may resist. Disregarding the end-users need is one of the risks that may lead to failing in an otherwise successful digital transformation. At present, managers often lack clarity about the different options and elements they need to consider in their digital transformation endeavours [3].

No sector or organisation is immune to the effects of digital transformation [3]. Faced with the challenges

embedded in the digital transformation process and the need to cut costs and to be efficient, the top-level managers must embrace the implications of digital transformation and drive better operational performance. A process that includes taking risk. The digital transformation process will lay the foundation for a revolution more all-encompassing than anything seen so far [34]. It is also stressed that the maturation of digital technologies will penetrate all parts of the market, including the public sector [35]. This new reality offers tremendous potential for disruptive innovation in the public sector, the health sector being a part of it.

Disruptive innovation requires three elements: (1) a techn ological enabler that simplifies previously complicated tasks, (2) a business model innovation that profitably delivers these simplified tasks in an affordable and convenient way, and (3) a new value network that reinforces a stakeholder position in this ecosystem [8]. A recent study on factors influencing risk acceptance of disruptive digital innovation within public sector organisations, highlights that the most important factors are: perceived benefits/opportunities, organisation's risk culture, lack of knowledge/understanding, lack of trust and ease of use [36]. Findings from a recent research reveal that there is a correlation between increased orientation toward end-users and end-user contexts and success in digital projects [37]. The conclusions from research state that the deeper the organisations are into the digital transformation processes, including innovating and implementing new digital services or tools, the more they need to understand the details of the end-users' use contexts [37].

D. A Conceptual Framework for Analysis of the Relationship between Soft Factors

Existing research presents many success/soft factors but does not indicate the existence of a practical relationship between these factors. For instance, in their study, Jacobi and Brenner discuss the soft factors in digitalisation projects and mentions that they are highly interdependent but does not describe clearly this interdependency [23]. A framework proposed in [25] explains in detail the role of leadership and employee well-being in the organisations' digitalisation process. But they only cover the relationship between these two factors, which does not provide us with enough understanding of how these relate to other soft factors in the digitalisation process. Also, another study identified possibilities to overcome obstacles in digital transformation and presented the relation between these obstacles and possibilities but did not quite show how they are dependent on each other [29]. Most of the studies stop at identifying the factors but does not go further to establish how they are related, thus leading to a knowledge gap on these dependencies.

In an attempt to cover this gap, the framework in Fig. 2 is proposed. The framework presents the significant soft factors identified from extant literature that facilitate the implementation of digitalisation projects and the relationships/dependencies between them. These relationships/dependencies are established based on the synthetization of theoretical support from reviewed literature. This framework therefore presents a collective outline from various studies that have pointed out these relationships individually. The objective of the framework is to show the relationships/interdependence between the soft factors as a group as we believe that this understanding will facilitate strengthening the relationships hence leading to a successful digitalisation. Also, identifying which factors are important without understanding how they affect/influence each other is insufficient. Establishing these dependencies will, therefore, aid decision-makers in organisations undertaking digitalisation initiatives to understand; (i) which factors to implement, (ii) how to implement them and (iii) whom to put in charge of ensuring successful implementation each of the factors.

Although the soft factors identified from theory, i.e. top management support; collaboration; communication, employee involvement; digital leader; training and re-training; competences; rewards and incentives; acceptance of change are significant to influence the success of digitalisation projects, they do not exist in isolation and should therefore not be examined as independent factors. These factors are interconnected, and they influence each other in various ways; some factors form the foundation of the existence of other factors, i.e. top management support for all other factors depend on it [38]. Whereas others are embedded within other factors, i.e. incentives and rewards are embedded in top management support, and collaboration is a soft factor on its own, but it is the job/responsibility of the digital leader to foster collaboration.

The proposed framework indicates that there are three important drivers of success in digitalisation projects in the organisation; these are (1) top management, (2) end-users and (3) the digital leaders [25, 28, 29, 38]. The main expectation from the top management is they ensure that the digitalisation initiatives are in alignment with the overall goal of the organisation [24]; the expectation from the digital leader is they facilitate a digital transformation culture in the entire organisation, i.e. lead the change [25] and the expectation from the end-user is they accept and grow with the change that comes with digitalisation [29]. The framework suggests that there has to be a constant flow of communication and feedback between these three players. In case of a communication breakdown between any of these drivers, project success will be impacted. Communication should be done constantly and ubiquitously if an organisation wants to transform digitally [20].

The framework also proposes that soft factors such as collaboration, training, employee involvement, end-user acceptance and change management are embedded within the 'digital leader factor'. Having a skilled digital leader is guaranteed to enable the smooth achievement of these factors throughout the project implementation as these are embedded within the responsibilities of a digital leader and supported by the skills that a digital leader must possess as stated in [10]. The framework also suggests that committing top management should go hand in hand with the provision of support in terms of resource provision for the project, addressing employee concerns and providing rewards and incentives [38]. The two players, i.e. top management and digital leader must not forget that the end-user is also an important player in the project in order to avoid project failure/resistance [28]. The framework also suggests that acceptance by end-users as a factor is dependent on all the existence of the other identified factors. If the end-users are involved, trained on new skills and competencies, the changes are communicated clearly to them, work in collaboration with each other, issues are addressed by top.

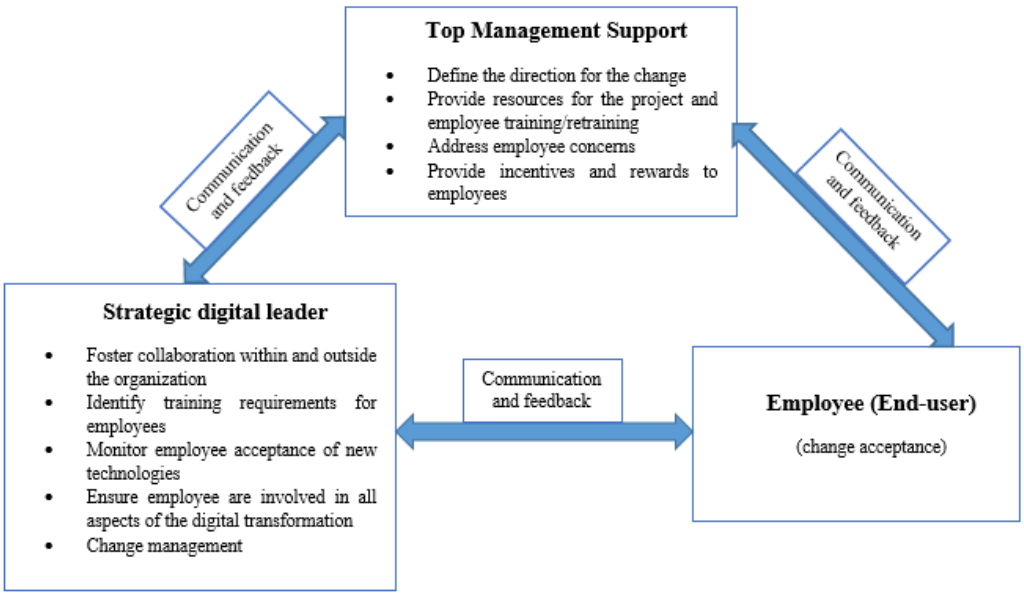

Fig. 2. A conceptual framework for the analysis of the relationship between soft factors

Management, the leader manages the change effectively, then the possibility that they will accept and adapt to the new technologies is heightened. If end-users feel they are part of the change, their acceptance intentions will be positive.

III. Discussion

It is important to note that the case hospital H was determined to implement this digitalisation project because being in the economic crisis, they needed to save hundreds of millions of Norwegian Kroners. Since 70% on Norwegian Health authorities' spending is on salaries, a project that reduced number of employees, i.e. voice recognition software to replace secretaries was a suitable one.

Using the case study, we will test the viability of the framework in Fig. 2. In so doing, we will address whether the identified soft factors were implemented in the hospital H and how they managed the risk-taking and innovation during the development of the digitalisation project and the outcomes that occurred as a result of implementing or not implementing the suggested factors.

Top management support. The case indicates that there was a huge commitment from the top management to implement the project given that there was an urgent need to meet the objective of cutting down costs. Unfortunately, the top management provided very little support, i.e. commitment without support. They provided monetary resources for the project and ensured training was done to the doctors. Although concerns were raised regarding patient safety, the top management provided no attention with regards to addressing these concerns despite the issues being raised from the beginning, paid no attention to the risk and vulnerability analyses results conducted and did not play their part in defining the direction for organisational change. The top management was more concerned and focused on the objective which was to downsize and implement an efficient workflow inpatient records that they ignored all the other important success factors, and as a result, the project was not accepted by the users it was designed for, which in [39] is defined as project failure.

Strategic digital leader. The case highlights that a new director was appointed to facilitate the new initiatives, but it was not clarified if he was to lead digitalisation changes as a digital leader or lead all hospital initiatives. This unclear definition of his role in the digitalisation project could have been a reason why the adoption of the project by end-users failed since it is the task of the digital leader to build a transformation culture, manage the change, foster collaboration and monitor end-users acceptance of the change. There was very little to no collaboration between the involved parties in the project. Without a strategic digital leader, it could explain why all these factors were not achieved during and after project implementation, which, as a result, led to end-users failing to adapt to the new change.

End-users. The case indicates that 99% of the doctors were dissatisfied with the new change. This is a clear example of how poor communication and non-involvement of end-users during project planning and implementation can have an impact to project success. And as the framework suggests, acceptance by end-users can be achieved if they feel part of the change, which in this case, they were not. The end-users were treated as an outsider of the project instead of an important driver of success.

Communication and feedback. There was no proper flow of communication between the management, the end-users, project team and the suppliers. Communication flow was poor such that the project team were not aware of the objections raised by end-users and even the management had no good idea on the actual work of the secretaries from the beginning. The end-users were not involved in the project

such that it was implemented despite their concerns on the safety of the patient and work overload.

Risk-taking and innovation. The case hospital was very adamant when it came to risk-taking and innovation. They went head-on in introducing the new digital technology in the hospital, but they failed in acknowledging that risk analysis and risk management is just as important. The end-users had concerns that the new system could threaten patient safety, but the top management did not address this effectively. The project could have been adopted more successfully had the important soft factors been considered and implemented during the project.

IV. Conclusion

In this paper, we took a retrospective analysis of soft factors and risk-taking in digitalisation projects in the health sector. A conceptual framework was proposed that presents the relationship between the soft factors identified which are: (1) top management support; (2) collaboration; (3) communication, (4) employee involvement; (5) having a strategic digital leader; (6) training and re-training; (7) competences; (8) rewards and incentives; (9) acceptance of change by end-users. It was shown that these factors are interconnected and they influence each other in various ways while some form the foundation of the existence of other factors, others are embedded within other factors. This interconnectedness indicates that an organisation should not pick and choose which factors they want to implement, but rather should look at these as a whole and implement them in unison. With regards to risk-taking and innovation, it is inevitable if an organisation wants to stay relevant, efficient, productive, effective and financially viable in the digitally transforming business environment they have to take risks and innovate making use of digital technologies.

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PAPER B

Insights on using project-based learning to create an authentic learning experience of digitalization projects

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Insights on Using Project-Based Learning to Create an Authentic Learning Experience of Digitalization Projects

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***Abstract*—This paper presents insights gained from a simulated project-based assignment in a project management course at NTNU. The simulated project-based assignment was developed in order to provide students with a first-hand understanding of the management challenges incurred in digitalization projects. The goal of the assignment was to help the students to have an overall view of the underlying concepts in digital development projects using other methods than lectures. In this paper, we present an account of the experiences gained from conducting this experiment. The paper describes the implemented simulated environment. The paper then presents the results of evaluating the effectiveness of the methods ability to provide students with sound and authentic understanding of key success factors for developing and implementing digitalization projects.**

Keywords—digitalization projects, project-based learning, competence development, soft factors, project management

I. Introduction

Digitalization has been identified as one of the major trends changing society and business in the near- and long-term future [1]. Digitalization involves the transformation of key business operations and affects products, processes, as well as organizational structures and management concepts [2]. The speed of this change is dependent on the context of this transformation: if the organization is forced to be changed or does it by its own. A target state, which can be reached by a digitalization process, is called an Industry 4.0, a new state of industrial revolution [3]

In management literature, digitalization is broadly defined as using digital technology in order to create entirely new products, processes or systems [1]. In sharp contrast to digitization, digitalization is not a software upgrade or just a reshuffling of an existing system or process. It is a planned shock to what may be a reasonably functioning system [4]. Digitalization projects are, thus, far more unpredictable, iterative and experimental.

Although research on digitalization is expanding, it is mostly focused on strategic and transformational consequences of digitalization rather than providing a framework for managing digitalization projects. A recent report published by DIFI [5] identifies some major complications encountered by public sector agencies when managing digitalization projects. The findings are based on reviewing 55 digitalization projects in the Norwegian public sector. These complications include:

- **Managing the collaboration** within a major digitalization project is something many organizations still find difficult either because of capacity, time or prioritization issues of the companies involved in the project. Collaboration is further complicated because of difficulties regarding how the achievement of the **benefit goals** shall be accomplished. One clear conclusion from the report is that the problems with the realization of project benefits are linked to the complexity of how digitalization projects are organized and managed. Commonly, the project organization that manages the project does not belong administratively to the organization or the organizations where the benefits will be realized. In other words, the governance structure of the project organization does not necessarily embody all the organizations that will benefit from the project.
- The report affirms as well that **value creation** of the reviewed projects is limited. Renewing, in contrast to just digitizing today's solutions, is supposed to create more radical changes. The report further emphasizes that renewal requires among other things involving end-users early and to use proper digital solutions and to involve suppliers in more far deeper context than today. There are many mechanisms which can prevent projects from taking full advantages of the available digital technologies to create novel solutions that add real value rather than just face-lifting. Among these mechanisms are the constraints imposed on project cost and scope. Also, several legal and technological constraints can prevent the creation of novel solutions [6]

II. Paper Objectives

DIFIs [5] report affirms further that digitalization projects require adequate project management competencies in order to address and resolve these challenges. This paper describes a project-based assignment that was used in project management course at NTNU to help project management students understand the complications of managing digitalization projects and to

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offer them essential knowledge about the interplay between the main factors that contribute to these complications.

We acknowledge that developing a project-based assignment that is capable of developing ***all*** the required skills needed to address all these complications is beyond the scope of this paper. We, therefore, limit the scope of the proposed assignment to demonstrate that digitalization projects require attention to three areas of concern. We denote these areas as pillars of managing digitalization projects. These pillars are innovation, digital technology and organization, as shown in Fig. 1.

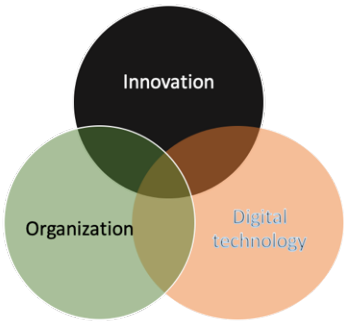

Fig. 1. Areas of concern in digitalization projects

Innovation is used in this context to denote the intended impact of the product or service the project was initiated to deliver. A typical concern of digitalization projects is to deliver products or services that can create substantial added value for the public (in terms of time, money, costs, efforts). The second pillar is the digital technology used in the project. Digital technology (or digital enabler) is considered important because, without it, no value creation will be achieved. However, digital enablers do not come without a price-tag; they might contribute to several changes to how various end-users interact with the developed solution. Digital technology might as well lead to changes to the existing work-processes (adding new work process or eliminating known work processes, or both). A typical concern of a digitalization project in this regard is to assess issues related to security, cost, impact, implementation risks, change management, a test of time, assess the maturity among other things.

Bär et al. [7] summarise the technological enablers of the digitalization process; they include:

- Smart manufacturing, the use of smart objects in the manufacturing environment,
- IoT, smart objects, products equipped with sensors and which interact and are integrated with the internet,
- VR, virtual reality creating real-time experiences in a virtual environment,
- AR, augmented reality, which is enabled via information and work instructions displayed on wearable devices,
- AI, artificial intelligence, an intelligent system was making decisions autonomously and executing tasks to eliminate the need for human interaction.

The third pillars in digitalization project are the project organization. Issues of concern might include managing collaboration between multiple units, managing benefit goals, securing funds, establishing alignment, governance, communication, planning and risk assessment [8]

III. Project-Based Learning

Project-based learning (PBL) is a model that organizes learning around projects [9] and is designed to engage students in an investigation of authentic problems [10]. PBL incorporates real-life challenges where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented. PBL facilitates thus individual and collective learning [11-14]. The use of projects for both learning and task achievement is most typically associated with action learning, which assumes that people learn most effectively when working on real-time problems that occur in their setting [15].

A. The Learning Objectives of the Assignment Include:

1) Providing students with an authentic learning environment that introduce them to the digitalization project
2) Providing students with a learning environment that enables students to comprehend the interrelationship between the organization, value creation and technology in digitalization projects.
3) Introduce the concept of digitalization using other methods than lecturing

B. Description of the Project-Based Assignment

An overview of the other instructional methods used in this introductory course can be reviewed in [16]. The main idea of the proposed assignment is to organize student-learning around developing digital resources and then using these developed digital learning resources to support self-paced learning outside the classroom. Students attending the subject will be working together on smaller project assignments. Each project assignment will then result in a digital learning resource. The assignment is conducted in self-enrolled groups of 4-6 students. Examples of these digital learning resources include and are not limited to:

- An animation of a real-life project case, explaining the main events, the challenges encountered, and useful insights gained from the real-life case.
- A computer simulation that shows how certain project variables are influenced by each other on the dynamics of their interaction.
- A gamified experience of a problem or a project situation using computer games.
- Gamified tests and quizzes to support learning.

The project assignment includes various deliverables at various stages of product development such as revisiting literature on digitalization projects, developing a project plan, delivering a final product and delivering a peer-review of products developed by other groups. A template that contained several questions that students were asked to answer was developed and made available. Students were given full autonomy to choose and undertake (manage) a digitalization project of their choice, but the main instruction from the project owner (course professor) was that the output must be for learning purposes and valuable

as a teaching aid to the professor and future students. Altogether 26 groups were formed and delivered the final products. Table 1 shows an overview of the final products produced by student groups.

TABLE I. OVERVIEW OF FINAL PRODUCTS

Product Type	Number
Animation of real-life project case	8
Interactive app	3
Video lecture on a selected topic in project management	3
E-book Interactive webpage show	1
Interactive film with multiple selections	1
Interactive game	1
Webpage	6

IV. RESEARCH DESIGN

In order to identify the gap in perception and understanding of the students, it was decided to conduct a survey pre and post an assignment to understand how their perception and understanding changed after undertaking the project. Therefore, the results presented in this paper is based on two main instruments:

First, the achievement of learning objectives from the assignment is assessed using two instruments. The first instrument is a prior-startup open-questions survey that was developed to measure students understanding of various concepts and challenges associated with digitalization projects before they started working on the assignment. The second survey is conducted at completion and tests the same variables as the first survey. Results from both surveys were then analyzed in NVIVO software. In this part of the research, data analysis was performed using a thematic coding approach in order to reveal common patterns that can be grouped into themes [17]. Using this approach, data were coded and labelled, and codes with the same label were grouped as a theme. The themes served then as a basis for further analysis and interpretation in line with recommendations from [17].

V. FINDINGS

A. Findings from Survey 1

Analysis of data collected from the first survey showed that students had some general understanding of the challenges of the digitalization project. However, these understandings were drawn based on reading literature [8] but without being able to reflect on the depth or association of these challenges. Furthermore, student reflections on success factors for digitalization projects may suggest that their understanding is limited to the managerial challenges that could be associated not only with digitalization projects but with any other type of projects as shown in Table II.

TABLE II. STUDENT UNDERSTANDING OF SUCCESS FACTORS BEFORE COMPLETING THE ASSIGNMENT

Planning and scheduling Risk management skills Stakeholder management Flexibility in the project and team	Team collaboration Good management and Continuous communication with stakeholders End-user acceptance

B. Findings from Survey 2

In the second survey conducted after completing the projects assignment, we have made the following observations: it is noticeable that student reflection around the challenges experienced and the measures needed to deal with these challenges are far more related to their actual experiences, as shown in Table III.

TABLE III. RESULTS FROM SURVEY 2. CHALLENGES

Factor	Number of Times Cited	Example Citation
Technology challenges and ICT skills	36	*Lacking professional knowledge and skills is a negative factor in this project as well But none of them had advanced, professional IT skills which could have been used to make an advanced digitalized product such as interactive learning website or mobile app*
Selection and deciding on product type and specifications (innovation)	20	*The first challenge was to get an idea of what possible options are for a feasible digital learning aid which creates a significant impact on learning*
Managerial challenges related to organizing the efforts. Such as conflicting priorities with other commitments. Availability, dealing with delays and other	13	*It was a problem for the group to find spare time because every group member has a different study program*

These findings may suggest that the main challenges encountered were in line with the typical challenges reported by DIFI [5]. The second interesting finding from the survey was students' reflections on the measures taken to resolve or to reduce the challenges. These factors are shown in Table IV.

Finally, students were then asked to say something about the most important lessons learned from the assignment, as shown in Table V.

The final part of the analysis consisted of a questionnaire that was sent to the students in order to gain their overall evaluation of the assignment ability to achieve learning objectives. The questionnaire was sent to all the students taking the subject, and 53 submitted valid responses. The results are shown in Table VI.

The results shown in Table VI suggest that the percentage of students who strongly agree or agree on all questions was far more than the percentage of students disagree or strongly disagree. On the question related to the assignment ability to create an authentic project management experience, 60% of the students agree or strongly agree that the assignment fulfilled its objects. A slightly higher percentage (65%) agree or strongly agree that the assignment helped them to see the triple-tasks in digitalization projects (organising the effort, creating an impact, and using technological aids). These are satisfactory results considering the time constraints of the project assignment.

TABLE IV. MEASURES TAKEN TO RESPOND TO THE CHALLENGES EXPERIENCED

Factor	Cited	Example Citation
Multiple evaluation methods to ensure value creation	16	*We decided to do personal interviews where we can observe the reactions, emotions and behaviour of each test user in every situation while they are using our website. These interviews were done either in a personal meeting or via video chat.*
Team collaboration	13	*Tasks are not specific member's sole responsibility. One can ask other members to help in the process, and they are expected to help.*
Project Planning	26	*You should use much effort in the planning phase. If you got a good plan, that covers risk and gives a good starting point.*
Team commitment	16	*keeping each other responsible even though there was no single project manager*
Focus on improving digital skills and learning	8	*Different areas of responsibility were assigned within the team, based on experience. As a result, all group members worked dedicated on their part of the project, and the project progression followed the schedule.* *Spending time to learn how the software worked*

TABLE V. MOST IMPORTANT LESSONS LEARNED

Lesson Learned	Cited	Example Citation
Agree on how to communicate	15	*The team should set up a fast, efficient, and reliable form of communication*
Definition of the objectives and scope of the project should be done collectively	10	*Identification of the project goal and its expected benefits was done and kept in mind during the project execution*
Get along with the team	26	*We think that the most important advice we can make is trying to make all members involved and motivated with the project; it is the easiest way to success.*
Get continuous feedback from end-users	26	*Getting feedback from the users is vital*
Define expectations first	8	*First and foremost, the group should study the requirements and expectations for the final product before deciding what the product is going to be*

C. Quality of the Final Products

When we looked at the students' understanding of the interplay between organizing, creating an impact and technological enablers and the impact on the *quality* of the final products, we observed that in those cases where the students got a high score on their final product, they also had a solid understanding of the interplay between the organization, innovation and the use of technological enabler. We defined the quality of the final product as the product's real impact on the learning process (meaning creating an added value for the end users), its functionality, availability (easy to access) and degree of innovation.

The quality of the final product was evaluated by a peer-group where the group sat a score of 0-10 based on the product's quality as a learning aid (gave value-adding), its functions, (if it worked as it should) and if it was a creative and innovative product. Three final products received a high score of 9 out of 10 based on the peer-review and 12 final products that received a score of 8 out of 10. Based on a thorough revision and evaluation of the final assignment reports we can suggest that there is a correlation between a final product of high quality and the student groups' ability to understand the interplay between the three pillars.

In those cases where the students had received a high score on the quality of their final product, the students demonstrated in their assignment reports an understanding of how the product would impact the learning process of the end-users. They stressed their dedication to the objective of the project as well as the active involvement of the stakeholders (innovation). Also, they had technical competence in developing the product or recognizing existing expertise that they could use (digital technology). The groups had also developed strong collaboration between the members of the group, as well as established good communication channels (organizations).

VI. DISCUSSIONS

In the following section, we shall present a short discussion of the factors that have contributed to the completion of this assignment based on the feedback from the students for each pillar shown in Fig. 1. First, we look at the influence of the soft factors on the success of project assignment.

A. Influence of Soft Factors

Soft factors have been identified to be crucial in facilitating project success even more than technical factors [18-20]. Feedback by student groups indicates that all the areas of concern in digitalization projects were considered and that it is the soft factors that actively facilitated the students to manage the interplay between these pillars. With regards to innovation, the students aimed at creating a learning tool that added value to the teaching/learning process of the course. The soft factors that facilitated attaining this were; (i) trust and openness, (ii) a dedicated team with a collective and clearly defined project objective, and (iii) stakeholder involvement throughout the project. The teams were flexible such that they were could incorporate the changes into the product when they received feedback from the stakeholders.

As far as the use of digital technology is concerned, the soft factors that facilitated the teams to succeed were: (i) competence development through individual learning and (ii) recognizing and using existing expertise within the team.

TABLE VI. RESULTS FROM THE ONLINE SURVEY

Objective	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The project assignment provided me with an authentic project management experience	25,45%	34,55%	25,45%	14,55%	0%
The assignment helped me to see the triple-tasks in digitalization projects (organizing the effort, creating an impact, and using technological aids)	25,45%	40%	25,45%	9,09%	0%

The soft factors that facilitated attaining the third area of concern (organizing the project) include: (i) proper communication between the team members which was done both physically via meetings and also via ICT tools in cases where physically meeting was a challenge and (ii) strong collaboration between team members and stakeholders.

Some factors were observed to be in the intersection of all the three areas of concern. This means that these factors acted like the *'building blocks'* to enable the other soft factors to be exercised. These are (i) team commitment, (ii) good leadership and (iii) positive working environment. From the case, it was observed that a positive working environment created a sense of ownership, kept the teams motivated and facilitated the building of trust and openness among members. Having good leadership and a committed team enabled students to effectively plan on how to communicate, collaborate and involve stakeholders properly. Good leadership enabled teams to identify and agree on which skills and competencies each member needed to learn within the project duration. This interplay is summarized in Fig. 2.

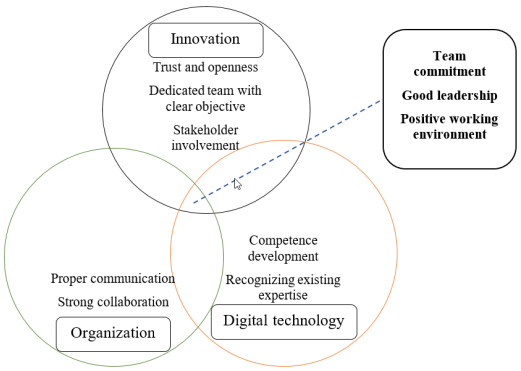

Fig. 2. The influence of soft factors on facilitating the interplay between innovation, organization and digital technology

VII. CONCLUSIONS

In this paper, we presented the findings from using a project-based assignment in order to prepare project management students for challenges brought by the digitalization project. Digitalisation projects are found on the intersection of three principal areas. These areas are innovation, digital technology and project organizing.

Findings suggest that the assignment managed to provide students with an authentic learning experience that have shown the importance of managing the challenges of these three areas. Furthermore, the quality of the final products suggests that groups who were able to understand this interplay have produced products that had a higher impact, they were able to manage the technological challenges adequately and organized themselves in such way to overcome various project management risks. From the course instructor perspective, there are further improvements that are needed in order to emphasise further the interplay of these areas in the digitalisation project. This will be done by providing students with deeper insights into the requirements for innovation, providing them with support and adequate understanding of the technological enablers and continue to emphasise that managing digitalization projects requires positive working environment, interpersonal trust, goal leadership and substantial team commitment. The findings from the student responses indicate as well several risk factors that emerged and had to be addressed. These include: 1) over-relying on few people during planning and execution of the project because of the need for their expertise which contributed to an uncertainty regarding the risk impact if these persons become ill or unavailable. 2) Also, it appeared that it was almost difficult to coordinate project planning with the development effort. The division of tasks may have contributed to starting prototyping before the project group took the final decision about the layout and design of the product, which contributed to several changes. 3) some groups mentioned that it is important to think big right from the start in order to create stronger motivation and confidence. Finally, we conclude our paper with a statement taken from student evaluation of the project assignment:

"The assignment was really useful and different kind of project that I have done till date. Learnt a lot during the journey".

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PAPER C

A Comparison of Soft Factors in the Implementation and Adoption of Digitalization Projects: A Systematic Literature Review

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A comparison of soft factors in the implementation and adoption of digitalization projects: a systematic literature review

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Abstract:
This study expounds existing literature on digitalization projects taking a one-dimensional view on people at organizational, project and individual levels. Through a systematic literature review, we highlight and contrast the impact of soft factors on the implementation and adoption of digitalization projects. Four core enablers were identified and contrasted at different organizational levels in an integrated framework for successful implementation and adoption of digitalization projects. Findings indicate that both adoption and implementation of digitalization projects have similar core enablers at organizational level, significantly different actions that need to be taken at project level and slightly different characteristics at individual level. Moreover, eight critical soft factors were identified for successful implementation and adoption of digitalization projects. The findings provide valuable insights to practitioners and enable controlling the highest value factors to increase the success rate of digitalization projects and to identify the core elements that need attention at various organizational levels. To the best of our knowledge, this is the first systematic literature review that expounds the extent of knowledge available on success factors within the context of digitalization projects taking the single dimensional focus on people at different organizational levels.

Keywords:
digitalization project; digital transformation; individual success factors; literature review.

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1. Introduction

Nearly 70% of the organizations studied by the Project Management Institute indicated their involvement in digital transformation (DT) initiatives in 2020 [1]. The number suggests a growing trend to initiate digitalization projects in the current business environment [2], facilitated by technology advancement [3]. Subsequently, researchers have made significant efforts to define digitalization projects. Sanchez-Segura et al. [4] define such projects as those developed in the DT process; Henriette et al. [5] define them as those involving the implementation of digital capabilities to support business model transformations whereas Grahn et al. [6] define them as projects involving introductions of digital tools. Although there is no an universal definition, there is consensus that digitalization projects involve the introduction or use of digital tools [6-8] and are undertaken to spearhead DT in organizations [4, 5, 9]. We define a digitalization project as one that introduces a digital tool that is implemented as part of the organization's DT.

Digitalization has attracted researchers' attention leading to research development on the topic. Such research include, for instance, barriers [10, 11], success factors [12, 13], impact and benefits [14], complexity [15], competences [16], soft skills [17, 18] and soft factors [19-21]. Existing research has focused on several dimensions of DT (i.e., people, technology, and processes), leading to generalization of factors making it challenging to understand and address explicitly the factors in the people dimension.

For successful digitalization projects, the people dimension needs attention [22]. Both technical and soft capabilities are required [23-26], but because soft factors are "hidden", likewise are easily neglected [27]. Hence, there is a need to create a deeper understanding of the influence of people dimension in the success of digitalization projects. We acknowledge the influence played by the "technology" and "process" dimensions on overall DT outcomes, but this study explicitly focuses on the "people" dimension by illuminating the significance of various soft factors for the success of digitalization projects.

The success rate of digitalization initiatives in 2012-2018 was between 16–20% [4], which is very low. Although researchers have attempted to expand the knowledge on digitalization projects, the topic has yet to gain attention within project management (PM) research. This is evident from the low number of scientific papers published in PM journals exclusively focusing on digitalization projects. In January 2023, we performed a search in Scopus for the terms "digital transformation project" and "digitalization project"/"digitalisation project" which resulted in a maximum of three hits for nine PM journals listed on Scimago Journal & Country Rank (SJR). The term "digital transformation" dominated returning 96 hits for all nine journals together, each of which had at least one hit. These journals are; (i) the Baltic Journal of Management, (ii) Procedia Computer Science, (iii) Journal of Modern Project Management, (iv) International Journal of Project Organisation and Management, (v) International Journal of Information Systems and Project Management, (vi) Built Environment Project and Asset Management, (vii) Project Management Journal, (viii) International Journal of Project Management and (ix) International Journal of Managing Projects in Business. On the contrary, the topic is discussed vastly in several conferences. A search conducted at the same period and database for conferences resulted in 5,907 hits for the term "digital transformation," 76 for "digital transformation project," and 75 for "digitalization projects," indicating an overall increase in interest in different research areas.

Digitalization projects are new, complex, and increasingly numerous and specific [28], hence making them different from traditional information technology (IT) projects [29-32]. Digital era has led to development of new organizations, systems, processes, leadership, ways of managing, and social aspirations requiring digitalization projects its own PM method [28]. Digitalization projects redefine a company's value proposition, aim to change an organization's identity, and drive a new business strategy, which differs from a traditional IT project that aims to support and enable the existing strategy and identity [32]. Project managers managing digitalization projects need proper means to unite the key factors of success of digitalization projects: flexibility, speed, creativity, transversely, globalist and business skills [28]. This study is an attempt to contribute to research dedicated on digitalization projects.

Successful outcomes of digitalization require focusing on adoption as much as implementation [33]. Nevertheless, existing studies have contributed to the topic through focusing on either adoption [10, 34, 35], implementation [12, 21, 36], or both [37, 38]. Furthermore, the factors affecting adoption of technological innovations and those affecting

implementation have been found to be entirely different [38]. During adoption it becomes more critical to ensure that the organization's culture and ways of working are in support of the overall DT [29]. There is a need to develop more insights on what exactly are similar and what are different in implementation and adoption, which this study aims to address. We refer to implementation as the undertaking of the project by the organization (i.e., translating the digital strategy into plans and actions). We use the word "implementation" in a broad and comprehensive manner to cover a set of capabilities, resources, and actions [31]. By contrast, we refer to adoption as the integration of digital technologies into the day-to-day operations by the end users.

This paper is organized as follows. The next section presents the theoretical background. The third section discusses the review process including the screening and appraising the relevant papers. The fourth section presents the results from the frequency and content analyses. The fifth section discusses the results through an integrated framework. The last section presents the conclusion where the contributions, suggestions for future studies and limitations of the study are highlighted.

2. Background

2.1 Project success factors

Project success factors constitute a set of circumstances, facts, or influences that contribute to the project outcomes (i.e., success or failure of a project), but the factors do not form the basis of the judgement [39]. Project success research has evolved over the years. Jugdev and Müller [40] classify the evolution of the understanding of project success into four periods. Period 1 between 1960s-1980s included the use of simple metrics to rate project success, minimal customer involvement and emphasized hard skills than soft skills. Period 2 between 1980s-1990s emphasized the development of critical success factor (CSF) lists and focusing on stakeholder satisfaction as an indicator of success. Period 3 between 1990s-2000s is when integrated frameworks for project success emerged. Period 4 which is the 21st century, included benefits to the organization and preparation for the future as a success dimension.

Since the development of CSF lists in the 1980s [40], several CSF lists have been created in varying contexts, for example, for Information and Communications Technology (ICT) projects [41, 42], petroleum projects [43], and for the influence of several CSFs on project success [44]. Hence, there is no only one list of factors that influence project success [45]. Vast research on project success factors exist but are usually listed in very general terms [46]. Success factors can be either technical or people-related, in most cases, the factors have been found to be people-related [47-49] - also referred to as soft factors. We use, the terms people-related factors and soft factors interchangeably.

2.2 Soft factors facilitating the success of digitalization projects

Strong leadership is crucial in the success of digitalization projects [23, 44, 45] because ongoing changes make it difficult to understand where change is coming from and whether it is unfolding within or across organizational boundaries [50]. Digital leaders require soft skills such as negotiation, influence, and change management [46]. Also, the ability to motivate, drive change, take risks, inspire, and to drive a shared ambition [51]. Nevertheless, both managers and employees at all levels should update their skills in order to tackle digitalization challenges [52].

Furthermore, the support and commitment of top management is crucial in facilitating successful digitalization projects [12, 23]. Top management sets strategies and engages employees [53], allocates resources, addresses employees' concerns, and communicates the project vision. Other soft factors identified as facilitating the success of digitalization projects include the provision of rewards and incentives [27, 54], employees' acceptance of new changes [55, 56], a dedicated and committed team [18, 57], trust and cooperation [27], collaboration [58], employee and manager and learning [59].

Some studies have investigated the relationship between various soft factors in facilitating digitalization projects' success. Hsieh et al. [60] investigate the importance of understanding cultural differences when communicating and collaborating. Larjovuori et al. [23] discuss the role of leadership and employees' well-being in organizations' digitalization processes. Ngereja et al. [20] show the interrelations between various soft factors. Existing literature

investigates either the role of specific soft factors or the relationship between several soft factors in the context of digitalization projects, such as the role of a digital leader [61], leadership and employee well-being [23], and culture [55], on digitalization projects' outcome. However, none provides an overview of the significance of soft factors in digitalization projects, and therefore this study will address this. We focus on the "people-view" because people drive DT [62, 63], hence a deeper understanding of the factors that influence people and vice versa will provide meaningful contribution. Thus, this review addresses two objectives:

1. To explore and contrast the impact of soft factors on the success of digitalization projects;
2. To identify the most critical soft factors in digitalization projects.

3. Methodology

This review follows the guidelines for conducting a systematic review by Tranfield et al. [64] and Levy and Ellis [65].

Two main search terms were included in the literature search: "soft factors" and "digitalization projects." A main string was created with four alternative search strings by interchanging the main search terms and searching in three databases which are Web of science, ScienceDirect and Scopus. As there were very few hits from the higher-ranking PM journals, the search was widened to include other journals specializing in business, management, and organization. Only peer-reviewed journals were included as they tend to have high impacts in the field and follow a rigorous review process to ensure quality. Conferences were excluded because although they may be peer-reviewed, they do not have metrics like journals, such as impact factor (IF). Inclusion criteria were applied followed by a thorough screening process. First, only titles and abstracts were screened for relevance then a second screening was done by scanning through the whole paper to check if the topic was related to success within the context of DT. The papers that were classified as relevant at the second screening were downloaded and read through thoroughly which resulted in 39 papers that were addressing the research objectives. The review process is shown in table. 1.

Table 1. The review process

<table>
<tr><td>Search strings</td><td colspan="3">(Soft factors OR human factors OR people factors) AND (digitalization projects OR digitization OR digital transformation)
("digitalization project success") OR ("digitization project success") OR ("digital transformation success")
("IT project success") OR ("IS project success") OR ("information systems project success") OR ("information technology project success")
(("Soft factors") AND ("digitalization projects")) OR (("soft factors") AND ("digitization projects")) OR (("soft factors") AND ("digital transformation"))
(("soft factors") AND ("IT projects")) OR (("soft factors") AND ("Information systems projects")) OR (("soft factor") AND ("IS projects)) OR (("soft factors") AND ("information technology"))
**Search strings were repeated with "human factor" and "people factor" instead of "soft factor" and modified according to the database</td></tr>
<tr><td>Databases</td><td>Web of Science</td><td>ScienceDirect</td><td>Scopus</td></tr>
<tr><td>Inclusion criteria applied</td><td colspan="3">1. Language: English
2. Document type: journals
3. Content type: must be conducted in the context of digitalization projects or be relevant in the context of digital transformation and include content on success factors of a soft nature (i.e., human/people-related factors)

Does the paper match the set criteria?

Papers included:
Web of Science (n =153)
Scopus (n =366)
ScienceDirect (n =384)
Total = 903 papers</td></tr>
</table>

First screening	Endnote files were downloaded and imported into the referencing software EndNote. • Duplicate records removed (n =3) • Conferences, books, book chapters, posters, reports, and predatory journals (n =278) • The titles and abstracts of the remaining publications were screened and excluded if they lacked the following criteria: - No mention of digitalization projects, digital transformation, or success factors (n=375) - Papers included in the next step of the review (full paper reading) = **247 papers**
Second screening	The papers were downloaded, and a second screening was done where further exclusion was done if there was: • No relevance to success of digitalization projects, digital transformation projects or digital transformation (n=162) - Papers included in the next step of the review (full paper reading for data extraction) = **85 papers**
Full paper reading	Green, red, and yellow color coding was used to classify the papers based on their relevance to address the research objectives. Green = very relevant (n=39); Yellow = relevance unclear (n=36); Red =irrelevant (n=10) - Papers included in the next step (Green) = **39 papers**
Quality assessment	Journal quality criteria (must meet any two criteria) 1. ABDC ≥ B 2. IF ≥1 3. SJR ≥ Q2 4. Harzing's Journal Quality List ≥ B Is the journal of high quality? 4 papers excluded from final analysis; papers included in the analysis (co-occurrence, frequency, and content analyses) = **35 papers**

Four journal ranking frameworks were applied: (1) journal IF, (2) SJR score, (3) Harzing's Journal Quality List (JOURQUAL), and (4) ABDC Journal Quality List. These established frameworks provide indicators of the quality and status of journals. We included journals with IF ≥ 1 reported in 2021. The Scimago Journal & Country Rank (SJR) score ranks journals from Q1 to Q4, where Q1 represents the top 25% journals and Q4 represents the 25% lowest ranked journals. Using the SJR 2021 score, we included Q1 and Q2 journals. The JOURQUAL includes five ranks ranging from A+ to D. We included journals ranked A+, A, B, and C, indicating *"world leading*," *"leading*," "*important and respected*," and *"recognized"* respectively. The ABDC ranks journals in four categories, A*, A, B, and C, indicating *"leading," "highly regarded," "well regarded,"* and *"recognized."* We included journals ranked A*, A, or B in 2019. Only journals listed in at least two of the four ranking frameworks were included, reducing the total number of papers to 35.

4. Data synthesis and findings

4.1 Data trends in selected paper

The selected papers were published between 2005–2021. A steady increase in publications was observed in the period 2016–2021, with majority of the papers (81%) published in that period suggesting a recent recognition of research on soft factors within the context of digitalization projects. Qualitative methods dominated (66%), followed by quantitative methods (28%), and a mix of both methods (6%). Interviews appeared to be the dominant method of data collection (40%), followed by questionnaires (31%), secondary methods (e.g., reviews, secondary sources, observations, meetings, workshops) (26%), and mixed approach method (3%). Inclusion of perspectives cross-cutting organizational levels enables to gaining of deeper insights [66]. Selected studies had respondents from top management positions (28%), management-level positions i.e., senior, and junior project managers (31%), employees/team members (17%) and members of the organization regardless of position (22%) and undisclosed (2%). The study participants in selected papers included international respondents dispersed across countries and continents. Of all papers, 31.2% had unspecified location while 20.3% comprised participants from a mix of countries. Those with specified location (48.5%), the majority report studies were conducted in Europe (28.6%), Asia (11.4%), US (5.7%) and Canada (2.8%).

Several digital technologies are discussed in the selected papers; Internet of Things (IoT) (31.4%), big data (14.3%), cloud computing (11.4%), artificial intelligence (AI) (8.6%) and automation (2.9%). However, majority of papers (31.4%) only discuss digitalization projects in general.

4.2 Addressing study objectives

Objective 1: For data extraction and analysis, VOSViewer software and content analysis were applied. VOSViewer was used to check author keyword co-occurrence. The keywords with the greatest total link strength with other keywords were identified, followed by content analysis. Since digitalization projects are conducted as part of the overall DT, this review focuses on both implementation and adoption to gain a holistic understanding of both. Three clusters were observed relevant to our study: (1) challenges, (2) barriers, and (3) success factors of digitalization project implementation and adoption. Each of the papers discusses either one or more of these aspects.

Clusters 1&2: Challenges and barriers (inhibitors)
34% of papers discuss challenges and 26% discuss barriers. Clusters 1 and 2 were merged, since they both presented factors that inhibit (i.e., barriers and challenges) digitalization project success. From Table 1, both implementation and adoption share challenges rooted in organizational culture, communication, and learning, but differ regarding the 'know-how' and 'why'. Implementation challenges are related to bureaucracy and lack of preparedness while adoption challenges are related to lacking a unified goal and inability to rethink and restructure new work.

Cluster 3: Success factors
Cluster 3 contains papers that discuss people-related success factors of digitalization projects implementation and adoption (79%). From Table 2, the success of digitalization projects is rooted in four main factors: (1) leadership, (2) culture, (3) capabilities development, and (4) top management support. During implementation, the digitalization leader is needed to push agendas that focus on achieving buy-in, while in adoption the focus is sustaining the buy-in. In building a like-minded culture, the focus in implementation is on individual mindsets, while in adoption the focus is on creating a collective mindset. For top management commitment, the focus in implementation is on managing bureaucracy and organizational politics, as this is where most challenges arise, while in adoption the focus is on investing in human resources to ensure that people have the tools needed to continuously integrate new changes. In developing capabilities, the focus in implementation is on knowledge exploration, while in adoption the focus is establishing proper mechanisms that support knowledge exploitation.

Table 2. Inhibitors and success factors of digitalization projects

	Inhibitors of digitalization projects	**References**	**Success factors of digitalization projects**	**References**
Project implementation	*Bureaucracy and organizational politics:* • Inability to react on a timely manner. • Lack of a sense of urgency. • Remain reluctant to adapt to changing nature of business.	[67]; [68]; [69]	*A highly skilled leader:* • Setting a clear vision. • Identifying and engaging with relevant stakeholders 'end-user involvement'. • Effective communication throughout the organization. • Building strong collaboration strategies. • Willingness to take risks in an uncertain environment. • Resistance management.	[70]; [71]; [72]; [73]; [74]
	Development of human resources: • Identification of new skills and training requirements. • Management of the changes in employee positions, tasks, and responsibilities. • Difficulty in retaining young employees. • Identification of required expertise.	[75]; [68]; [76]; [69]; [77]; [78]	*Top management support and commitment:* • Rewarding digital initiatives. • Provision of resources. • Investment in human resource development strategies.	[79]; [68]; [21]

	Inhibitors of digitalization projects	References	Success factors of digitalization projects	References
	Lack of preparedness to tackle digitalization: • Low level of understanding of what digitalization entails. • Unclear or lack of vision. • Inability to define complex processes early. • Unclear definition of roles and how they will change. • Inability to clearly define the "why".	[70]; [67]; [76]; [69]; [77]	*A like-minded culture:* • A culture in which people support each other. • A culture supportive of change. • Having self-motivation and a sense of ownership. • Taking the initiative to learn. • Building trust between leaders, managers, and employees.	[72]; [73]; [59]; [80]
	Having a rigid culture: • Units working independently in silos. • Weak internal and external collaborations. • Failing to prepare people for the change. • Technology oriented culture. • Lack of initiatives/taking charge. • A culture of complacency (no sense of urgency). • Lack of a flexible and adaptable mindset.	[70]; [67]; [77]; [72]; [59]	*Building employee capabilities:* • Provision of training for both social and technical expertise. • Giving room for experimentation. • Managing the learning process.	[71]; [81]; [74]; [21]
	Lack of proper knowledge-sharing mechanisms: • Training without defining the knowledge gap. • Knowledge not readily and widely available. • Lack of mechanisms to utilize acquired knowledge. • Improper knowledge-sharing mechanisms 'people do not know what others know'.	[4]		
	Communication-related issues: • Increase in heterogenous ways to communicate (increases complexity and frustration). • Decreased sense/perception of information security. • Inability to clearly communicate new regulations.	[59]		
Project adoption	*Lack of a unified communication protocol:* • Lack of clarity on how to integrate and share information. • Dispersed information posing safety and security concerns. • Increase in heterogenous ways of communicating (increases complexity and frustration). • Decreased sense/perception of information security. • Inability to communicate new regulations clearly.	[10]; [11]; [34]	*Skilled leader to lead the transformation:* • End user involvement. • Effective communication of the new circumstances. • Building a culture with strong connectedness of employees.	[74]; [82]
	Development of human resources/capabilities: • The need for continuous learning. • Lack of appropriate expertise. • Shortage of skills and a qualified workforce.	[83]; [10]; [11]	*Top management support and commitment:* • Rewarding digital initiatives. • Provision of resources • Investing in human resource development strategies.	[82]; [68]; [79]
	Unable to build a change culture: • Lack of a common mindset • Unable to build a strong collaborative culture	[10]; [11]	*A supportive environment/culture:* • Organization has the capacity to change. • Presence of collaborative culture. • Environment that supports new ways of working.	[79]; [72]

	Inhibitors of digitalization projects	References	Success factors of digitalization projects	References
	Unclear vision of transformation: • Having contradicting interests between units. • Not having a clear and unified goal throughout the organization (i.e., each unit has a different goal). • Facing resistance from people in the organization.	[11]; [71]	*Building employee capabilities:* • Access to skilled/ experienced employees. • Managing the learning process. • Having knowledge seeking employees.	[82]; [68]; [81]
	Unable to rethink and restructure new work, including: • Conflict management. • Leading in the new digital context. • Shaping the culture in the digital context. • Inability to evaluate, prepare, and accept new. requirements, regulations, and standards.	[59]; [75]		

Objective 2: Frequency analysis was conducted to address this objective as it enables identification of number of occurrence of a factor thus indicates emphasis and the recognition among researchers. To rank the factors, a normalized value method was calculated for each factor using the formula;

Normalized value (NV)= (mean – minimum mean) / (maximum mean – minimum mean).

Soft factors identified from the review are listed in Table 3, from highest to lowest frequency of occurrence. Eight critical soft factors with ($n \geq 5$) were identified as having gained most recognition among researchers. These are learning, organizational support, collaboration, organizational leadership, end user involvement, organizational culture, provision of training, and soft skills of project manager.

Table 3. Soft factors identified as important for successful digitalization projects.

Soft factors	Reference	frequency	normalized value
Learning	[29]; [84]; [85]; [19]; [12]; [86]; [81]; [59]; [21]	9	1.000
Organizational support	[70]; [79]; [29]; [67]; [12]; [68]; [87]; [54]	8	0.875
Collaboration	[85]; [73]; [80]; [56]; [81]; [59]; [58]; [82]	8	0.875
Organizational culture	[84]; [19]; [68]; [73]; [56] [58]	6	0.625
End-user involvement	[70]; [79]; [29]; [71]; [21]	5	0.500
Organizational leadership	[68]; [54]; [56]; [81]; [82]	5	0.500
Provision of trainings	[71]; [19]; [68]; [54]; [74]	5	0.500
Soft skills of project manager	[71]; [19]; [18]; [80]; [81]	5	0.500
Sense of ownership	[56]; [82]; [21]	3	0.250
Communication	[71]; [19]; [54];	3	0.250
Soft skills of team members	[71]; [54]; [80]	3	0.250
Innovation-based mindset	[80]; [56]; [21]	3	0.250
Rewards and recognition	[84]; [54]; [81]	3	0.250
Human resource management	[85]; [68]	2	0.125
Dedicated team	[71]; [85]	2	0.125
Motivation	[80]; [56]	2	0.150
Supportive environment	[79]	1	0

5. Discussion

Our findings show that both implementation and adoption of digitalization projects require multilevel readiness, at organizational, project, and individual level. Patanakul and Shenhar [88] acknowledge the importance of aligning project implementation with higher level organizational strategies and involving people from all organizational levels to execute their roles to achieve the intended business results.

Four core enablers were identified at the organizational level, which we term as organizational leadership, organizational culture, organizational support, and organizational learning, and we consider these as core elements in the governance of digitalization projects. No differences were observed between the core enablers during implementation and adoption at organizational level, therefore, they form the four core enablers in the integrated framework. However, there were significant differences between the actions taken during implementation and adoption at project level. Moreover, the characteristics that team members should possess during implementation and adoption at individual level are relatively similar and in both cases the crucial characteristic is that individuals have the willingness to be a part of the change. These similarities and contrasts are presented and elaborated in the integrated framework (Table 4) below.

Table 4. An integrated framework for the successful implementation and adoption of digitalization projects

Successful implementation		Individual characteristics of team members	Specific actions taken at project level	Core enablers at organizational level	Specific actions taken at project level	Individual characteristics of team members		Successful adoption
		• Open to new ways of working (e.g., collaborating with external parties)	• Identifying and engaging with relevant stakeholders • Ensuring adequate project governance	**Organizational leadership**	• Ensuring effective end user involvement • Establishing proper communication channels (i.e., digital, and traditional)	• Being open to flexible working conditions (e.g., hybrid working and integrating several communication channels)		
		• Willingness to take risks in an uncertain and dynamic environment	• Creating a trustworthy project environment	**Organizational culture**	• Identifying and addressing emanating concerns from team members	• Willingness to share own opinions		
		• Personal motivation for personal development/growth • Open to new roles and tasks	• Affording team members accessibility to different projects and different teams • Allocating suitable mentors to team members	**Organizational support**	• Ensuring manager accessibility for meetings with team members • Evaluating performance to identify areas for improvement	• Having proactive individuals who seek feedback, clarification, and evaluation regarding their performance		
		• Having a knowledge-seeking attitude • Willingness to take the initiative to experiment with new ideas	• Allowing room for experimentation • Providing training as and when needed	**Organizational learning**	• Establishing proper knowledge sharing mechanisms • Frequent sharing of new requirements, regulations, and standards	• Willingness to share with and learn from others		

During implementation, the focus at project level is on stakeholder management and creating opportunities for external collaborations. As digitalization projects are especially focused on experimentation and adaptation [74], engaging with third parties is a commonly used strategy to increase the organizational pool of information and expertise [29]. By contrast, during implementation, the focus is on gaining end users' acceptance and ensuring communication channels are properly integrated into daily tasks.

The focus at the organizational level is on building a like-minded culture. Additionally, the contrast between the actions to be taken at project level is significant for organizational culture. During implementation, building trust is important to facilitate risk-taking by creating a safe environment. During project adoption, the focus is on addressing team members' concerns, such as how the change might affect their work, and the new opportunities or threats that might arise from the change.

At the organizational level, a strong organizational support is crucial. However, at project level, this support appears differently during implementation and adoption. In implementation, the focus is on exposing project team members to several project opportunities so that they can identify where they can contribute best. At individual level, it is important that the team members are open to new tasks and are personally motivated to develop their knowledge. By contrast, during adoption, support is provided through the project manager's accessibility to the team members, which in turn requires team members' proactiveness to seek feedback and clarification.

For implementation of organizational learning, the focus on project level is mainly on experimentation for new knowledge creation. Project managers should support experimentation and identify relevant training sessions for their team members. At individual level, team members should be proactive in sharing their training needs. By contrast, the focus during adoption is establishing appropriate learning mechanisms to facilitate continuous learning. Thus, at individual level, willingness to learn is crucial.

The proposed framework shows the multi-faceted nature of successful digitalization projects, requiring multilevel enablers that span organizational, project, and individual levels. This interconnected perspective underlines the importance of an integrated, comprehensive understanding of the factors that leads to successful DT. This multilevel perspective offers a holistic understanding of DT, recognizing the integral role played by each level in managing digital initiatives. The framework also functions as a strategic guide, illuminating the soft factors organizations should prioritize for more effective implementation and adoption processes. By highlighting the necessity for multiple enablers at various levels, the framework enables organizations to strategically distribute their efforts, achieving a balanced approach to resource allocation. The framework also serves as a risk management tool, aiding in identifying potential risks across various levels within the organization.

Adopting this integrated multilevel approach can significantly enhance the success rate of DT projects, improving organizational efficiency and fostering an innovation culture. Moreover, the framework highlights several actions that should be implemented on the project level, including engaging end users for valuable insights, fostering effective communication, addressing team concerns promptly, ensuring managerial accessibility, regularly evaluating performance for continuous improvement, and promoting knowledge sharing. Also vital are keeping abreast with new requirements or regulations, engaging relevant stakeholders, ensuring robust project governance, fostering a trust-based environment, offering team members diverse experiences, providing proper mentorship, allowing space for experimentation, and delivering necessary training.

Each component contributes to creating an environment conducive to project success, enhancing team efficiency, morale, and fostering innovation. The findings underscore the significant role of individual team members in digitalization project success. Skills and knowledge, attitudes, motivation, and capacity for collaboration all influence the project's outcome. It highlights that understanding and leveraging these individual characteristics and providing necessary training can optimize team performance. The findings stress the importance of a human-centered approach, suggesting that technology alone is insufficient for successful DT; rather, the individuals implementing and using this technology play a vital role in driving these projects forward.

Furthermore, our findings relating to our two study objectives concur in the sense that the four core enablers that form the basis of the integrated framework are among the eight critical soft factors identified. We found learning to be the most critical factor. Although this finding is consistent with the findings of researchers who identify the building of know-how as an asset in the successful implementation of digitalization projects [12], we believe this is also attributed to other factors. One such factor could be that digitalization projects are not undertaken as a one-off initiative, unlike other projects, but as a part of or as one of the projects in the whole DT process [4]. For this reason, digitalization projects have greater potential to trigger organizational change while simultaneously requiring change [29]. Such changes require rethinking the entire workplace, including the development of new tasks, structures, skills, and capabilities, and therefore employees and managers should be encouraged to realize and seek to improve their capabilities and skills to be able to deliver the expected value in delivering the projects. These new requirements would influence the development of knowledge at all levels of the organization and further emphasize the need for continuous training of the people involved in projects.

6. Conclusion

This literature review has provided an in-depth exploration of factors that influence the implementation and adoption of digitalization projects, with a specific focus on the people dimension. To the best of our knowledge, this is the first systematic literature review that expounds the extent of available knowledge of success factors in the digitalization context and contrasts them at different organizational levels. The findings contribute to both research and practice through unveiling learning as the top critical success factor in DT context. In addition, a proposed framework is presented that highlights the multi-faceted nature of successful digitalization projects, requiring multilevel enablers that span organizational, project, and individual levels. The framework also highlight some difference and similarities between the two on project and individual levels that are worth noting.

On project level, the similarities are that both implementation and adoption require effective engagement with stakeholders, both emphasize proper communication channels and accessibility, and both value knowledge sharing and capacity building. For adoption case, this includes establishing knowledge sharing mechanisms while for implementation involves assigning appropriate mentors and providing training as needed. Differences at project level include; in implementation, the need for adequate project governance is emphasized. Furthermore, implementation projects place emphasis on creating a trustworthy project environment which involves building a space where team members feel safe, secure, and able to trust their colleagues. This is not specifically mentioned in the actions for successful adoption of digitalization projects. While experimentation is mentioned as an important action for successful implementation of projects, it is not specifically highlighted in the actions for successful adoption of digitalization projects. Whereas a clear emphasis is put on evaluating performance to identify areas for improvement in adoption, it is not explicitly mentioned for implementation projects although it is likely important as well.

On individual level, there are also some similarities and differences that are worth noting. Similarities include that both implementation and adoption demand a level of openness from the team members, highlight the importance of taking the initiative and underline the importance of a learning attitude and willingness to share knowledge or opinions. Differences are that for implementation, team members are required to be willing to take risks in an uncertain and dynamic environment. This might be due to the project's nature which could be more innovative or explorative, needing more tolerance for risks and uncertainty, team members in implementation projects are expected to have a personal motivation for growth and development. This might be significant in projects that necessitate continual learning and adaptation to new roles and tasks. In adoption, having proactive individuals who seek feedback and performance evaluations is important.

6.1 Future studies

Building from our review, we present areas for further studies:

- How do organizations ensure project manager readiness in the management of digitalization projects?
- How organizations strike a balance between knowledge exploitation and exploration in the DT context?
- What are competencies needed for DT at different organizational levels?

6.2 Limitations

This study is subject to some potential limitations. First, the different use of terminologies (i.e., digitalization projects, digital transformation projects, digitization projects) might have caused overlooking relevant publications. Second, we limited our searches to three databases which may have led to overlook publications in other databases. Third, given that the term “digitalization projects” has yet to gain much attention in the project management field, the identification of relevant publications might have been limited.

Conflict of interest

There is no potential conflict of interest with respect to this research.

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PAPER D

An examination of the preconditions of learning to facilitate innovation in digitalization projects: a project team members' perspective

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An examination of the preconditions of learning to facilitate innovation in digitalization projects: a project team members' perspective

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Abstract:
In the modern business environment spearheaded by digitalization, organizations are faced with the challenge of maintaining a competitive edge despite constant dynamic changes. Organizations therefore, have to adopt new, improved and modern ways of doing things. This can be achieved through proper knowledge management within the organization, which is an antecedent of innovation. Innovation is one of the crucial means for tackling the digitalization challenge as it enables organizations to maintain their competitive edge. Although extant studies have extensively studied learning in projects, there is a lack of concrete examples of the correlation between learning and improving innovation in the digitalization context. This article is based on a qualitative study aimed at examining the organizations' preconditions of learning in achieving innovation in digitalization projects focusing on the perspective of the project team members. Data was collected through open-ended questionnaires with a total of 97 respondents and analyzed using NVivo qualitative software. The findings revealed two viewpoints regarding the perception of learning for innovation. The preconditions for learning for innovation in digitalization were also identified. Moreover, the immediate outcomes of learning were identified that can be utilized in assessing whether employees are actually learning given the necessary preconditions are established.

Keywords:
learning; innovation; digitalization projects; enablers; preconditions.

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1. Introduction

Learning and innovation are common terms in today's business environment. Whereas learning is considered a mediator of innovation [1], people are considered the carriers of knowledge and are consequently regarded as the drivers of innovation [2]. Learning facilitates creativity, inspires the generation and development of knowledge, and increases the ability to recognize and apply new ideas [3]. It is pivotal for organizations to create a suitable environment that will encourage individuals to learn [4] because knowledge use amplifies the performance of both individuals and organizations [5]. However, this does not imply that it is an easy task to create a learning culture, especially in a constantly changing business environment [6].

Over the past five decades, technological advancements have shaped our societies and ultimately led to the adoption of digitalization [7]. In turn, digitalization has been adopted in various business aspects, such as in optimizing processes, business models and customer involvement [8]. In such business environments, organizations face the challenges of constantly exploring new alternatives, redeploying their existing resources, and developing new capabilities and routines [9]. To unravel such challenges, organizations need to initiate approaches that expedite changes and adaptations, and stimulate improvements. Digitalization may have emerged as a crucial enabler that facilitates organizations' changes [10]. Because it facilitates the transformation of businesses, digitalization facilitates improvements and maintaining competitive advantages, subsequently enabling the creation of benefits such as productivity improvement, innovation, and cost reduction [11].

In order to remain competitive and relevant in the current changing environment, it is imperative that organizations, specifically project-based organizations, take an effort to ensure smooth acquisition, sharing and utilization of knowledge between individuals and teams. This can facilitate improvement in their performance through error reduction and the creation of novel ideas i.e., innovation. This is in line with the claim by Quinn and Spreitzer [12] that, in current business environments and due to global competitive markets and higher customer expectations, organizations require employees to accomplish more than the norm. Similarly, Roblek et al. [13] acknowledge that knowledge management is a significant factor to enable organizations to generate sustainable competitive advantage and facilitate success of digitalization projects in the current economy [14].

Hussein et al. [15], suggest that the challenges of digitalization projects are rooted in the interplay of three dimensions; (1) managing collaboration between the diverse individuals or organizational units; (2) managing the creating of new processes, products or services that create value, frequently referred to as innovation [16], and (3) managing the procurement or introduction of the digital enablers or digital technologies to create the intended novel solutions. These three dimensions constitute therefore the main efforts in managing digitalization projects and we refer to them as the pillars of managing digitalization projects.

Knowledge management is frequently identified as an important antecedent of innovation. Given the importance of innovation, multidisciplinary researches have looked for answers to the critical question *What can be done to improve innovation?* (e.g., [17], [18], [19], [20]). Knowledge handling has become a significant task in organizations [21]. Similarly, knowledge sharing is an important step in the learning process. To achieve innovation, employees need to acquire knowledge and share it within their organization [22]. This is in line with Camps et al. [23], who claim that learning processes originate from individuals' acquisition of knowledge and evolve with the exchange and integration until collective knowledge is attained.

Tohidi et al. [3] highlight innovation as influenced by organizational learning and emphasize that organizations seeking to innovate should consider strengthening their learning culture. This is in line with Ukko et al. [1], who state that innovation demands creativity, and organizational learning is the key to achieving that level of creativity. Chen and Lin

[24] suggest that for organizations to develop knowledge, there should be a dynamic environment, specific knowledge, intentional employees who possess sufficient capabilities and high levels of autonomy. Thus, the environment plays a crucial role in organizational learning. This is in line with Daemi et al. [25] who stated that the environment of an organization has potential to either support or impede the successful implementation of initiatives, models or ideas.

The huge challenge facing learning in projects involves the retention of knowledge once the project has been completed and the team has moved to other projects. In such circumstances, there is a risk that the knowledge and experience gained will be lost [9]. To avoid loss of knowledge, it is important to construct ways in which it can be retained and shared within the organization [9]. Giles and Cormican [26] suggest having a proper idea management system, such as idea banks, for easy contribution and evaluation of ideas in a collaborative manner.

The relationship between learning and innovation is more prominent in organizations with comparatively more innovative climates [27]. Organizations have a large part to play in ensuring that conditions are supportive for learning. It is important to have motivated employees, as this facilitates their independent searches for knowledge related to their tasks, hence increasing their capability to innovate [28]. According to Escrig-Tena et al. [29], a proactive behavior for the workforce is a necessary prerequisite for innovation. Organizations can also facilitate their employees' learning by investing in training and knowledge development programs to expose employees to broader perspectives, expertise and deeper insights, thus building their capacity to find creative solutions in their tasks [30]. Employees' skills, attitudes, knowledge, and competencies are generated through training and development, which then leads to improved productivity, effectiveness and efficiency in organizations [31]. Siddique and Hussein [32] found that employees were content in their jobs when they learned something new during their work. This is in line with Rhoades and Eisenberger [33] and Bassett-Jones [34], all of whom support the idea of organizations' investing in employee learning.

Van der Sluis [35] highlights the team's working climate as an important factor influencing people's creativity in their jobs. He highlights the aspects that have a positive influence on innovation as being; a favorable team climate, managerial support for learning, a challenging work environment, mentoring, and good relationships. The relationships between peers, teammates, supervisor, and subordinates must be of quality [36] in order to support creativity and innovation. When there is a good relationship between team members, problems are solved more quickly, which enhances an organization's overall performance [37].

Although we know much about the topic of organizational learning and on the preconditions that facilitate learning between projects, the current body of knowledge lacks concrete examples of the correlation between learning and improving innovation in the context of digitalization. Therefore, this article takes a bottom-up approach towards understanding the preconditions that influence employees' learning in current constant changing business environment i.e., digitalization context. Considering that the focus of this study is on how organizations can achieve innovation through employees' learning, hence use of the term '*learning for innovation'*. We examine the preconditions of organizations that facilitate employee learning in order to innovate, but with a particular focus of digitalization projects. Accordingly, we examine the conditions needed in order to improve the employees' ability to learn so they can be innovative in accomplishing their project tasks.

In addition, considering that evaluating whether learning has indeed occurred is of great value in adding quality to the learning process [38, 39], we examine the immediate outcomes that enables the team members to identify if they have learnt. To achieve this, we address the following research questions:

1. *How is learning for innovation perceived in the context of digitalization projects?*
2. *What are the enablers for learning for innovation in digitalization projects?*
3. *What are the hinderances for learning for innovation in digitalization projects?*
4. *What is the immediate outcome/evidence that makes you realize you have learnt for innovation?*

We acknowledge the existence of numerous studies on internal and external knowledge transfer in and between organizations. Moreover, the scope of this study only covers the aspect of learning for innovation during the accomplishment of projects and other organizational tasks, and therefore the focus is directly on the organizations' internal conditions and strategies for knowledge acquisition and sharing. It is important to highlight that projects studied in the context of this study are projects that have been conducted in the current dynamic business environment and therefore are characterized by a high demand of skills, competencies, technological advancement, experience and digitalization, herein referred as '*digitalization projects'*.

The remaining of this part is structured as follows; section 2 presents a theoretical background on organizational learning and introduces the concept of learning for innovation; the methodology adopted in conducting the study is described in section 3; the findings of the study are presented in section 4 and discussed in section 5; and finally section 6 concludes the study, presents the limitations and recommendations for further studies.

2. Background

2.1 Learning in the organizational context

There are many perspectives on organizational learning. However, common to all perspectives is that we cannot call anything learning if the knowledge that we gain is not exploited for a useful purpose [40]. The complexity of learning in organizations is rooted in the fact that learning is a multilevel phenomenon involving individual, group, organizational, and, at times, population levels of analysis [41]. There is general consensus in the organizational learning literature that organizational learning begins at the individual level and the acquired knowledge is propagated through groups and further to the organizational level. Duhon and Elias [42] claim that an organization knows something if just one person in it has the knowledge in question, and that organizational culture and structure enable knowledge to be reused effectively. The move from the individual learning to organizational learning is not simple. Ideally, for an organization to learn, first individuals must acquire knowledge [43], [44]. There is also broad acceptance that knowledge gained at the individual level does not become organizational learning until it is shared, integrated and institutionalized [45].

2.2 Perspectives on learning

Although interest in the issue of learning in organizations dates back to the late 1950s, that interest grew up almost unnoticed until a sudden explosion in the late 1980s [46]. Despite a lack of a consensus on a definition of organizational learning, there is agreement on three broad perspectives that form the foundation of the definitions [47]:

- *Cognitive*. From this perspective, learning is described as a system of information acquisition, storage, retrieval, and transfer, regardless of whether knowledge is converted into actions [48]. From this perspective, learning is attained by gaining insights into and identifying associations between past actions, the effectiveness of those actions, and possible future actions. Thus, lessons learned are mainly shared understandings of organizational problems and possible remedies, and they constitute the knowledge base of the organization [49].
- *Behavioral*. This action-oriented perspective focuses on changing behaviors as a result of learning [50]. The lessons learned from this perspective are the changes that must be implemented to change individuals' or organizations' future behavior, thereby institutionalizing the lessons learned [48].
- *Social constructivist*. There are two schools of constructivism [51]. In cognitive constructivism, an individual's reactions to experiences lead to (or fail to lead to) learning. In social constructivism, meaning it is not simply constructed, but is co-constructed. The social constructivist perspective challenges the traditional idea that

learning takes place within the heads of individuals through information processing. It starts from the assumption that individuals learn through constructing knowledge in practice, and that learning is situated and occurs mainly through conversations between people within their socio-cultural settings [46]. This perspective suggest that learners are social beings who construct their understanding and learn from social interaction [52]. Hence, compared with the other two perspectives, it places stronger emphasis on socially oriented approaches to the understanding of learning and knowing.

Hussein [40] argues that each of the above three perspectives is important in order to understand how learning takes place within and between projects, as well as to understand how learning impacts organizations' rules, systems and structure. For example, the *behavioral perspective* (i.e. action-oriented perspective) of the organizational learning is useful for understanding how accumulated knowledge contributes to the implementation of changes at either the project level or the organizational level, such as through changing procedures and processes [53]. The *cognitive perspective* is useful in order to understand knowledge as a utility and how receivers of knowledge interpret, process, frame, and reframe the knowledge utility in their own contexts in order to update or modify their mental models [44]. The *social constructivist perspective* is useful to understand how learning is linked to social interaction and particularly useful to understand social processes in cooperation with the cognitive perspective of learning support learning within projects or between projects [54].

The main criticism regarding the organization learning literature is that to a large extent it is too abstract and conceptual, and does not provide concrete guidelines on how to achieve learning in organizations or to measure that achievement [55], [56]. Additionally, there are many views on organizational learning that complicate understandings of organization learning as a concept. Tsang [48] even argues that the number of definitions of organizational learning is equivalent to the number of writers on the subject.

Fiol and Lyles [50] attribute the confusion about organizational learning to the original definition provided by Simon [57], who defines organizational learning as the growing insights into and successful restructurings of organizational problems by individuals as reflected in the structural elements and outcomes of the organization itself. Simon's definition suggest that learning consists of both the development of insights, and the development of structural and action outcomes. Furthermore, the two elements often do not occur simultaneously, which makes the problem of distinguishing between them difficult. As a result of this confusion, scholars have understood organizational learning from various perspectives such as new knowledge, new structures, new systems, or mere actions, or some combinations of the aforementioned.

2.3 Learning in project-based organizations

Project-based organizations often are more customer oriented than other types of organizations, and primarily operate with short-term projects that are specific to identified customer needs [58]. Additionally, project-based organizations share some distinct knowledge and learning characteristics:

1. The projects follow a stage gate model with predefined deliverables, and predefined performance goals and specifications. Thus, the teams involved in the project have then to come up with more or less customized solutions, within a strictly limited period of time. Subsequently, individuals and teams have little time for reflecting on their own collective experiences.
2. Individuals or teams may form a knowledge silo that is not accessible to members of other projects or the wider organization.

In addition, learning in project-based organizations consist of intertwined learning activities that complicate knowledge sharing and reuse [40]:

- active experimentation, reflection, accumulation of knowledge, and probably capture of knowledge within the focal project. This type of learning activities is denoted as learning within projects [59], intra-project learning [60], project-based learning [61], or simply project learning [62];
- deliberate seeking and utilization of knowledge and experience from other individuals, other projects (even outside the organization), or from completed projects, or from the organizations' asset bases to support the learning process. This dimension of learning is denoted as learning between projects [63], inter-project learning [64], and cross-project learning [62].

Intra-project learning materializes when individuals are given the opportunity to experiment, reflect and accumulate knowledge individually or in groups while being engaged in a project. This is primarily a learning-by-doing approach and is a part of the experiential type of learning [65, 66]. Experiential learning is defined by Kolb [67] as "*the process whereby knowledge is created through transformation of experience*." Kolb's experiential learning cycle has become a widely accepted model to explain the role of experience in learning (Fig. 1). Kolb's model demonstrates that experience alone without conscious reflection is not enough [68]. Rather, reflection is needed to conceptualize experiences as insights. Only then can new insights be shared and tested in new situations that in turn lead to new experiences, and ideally the cycle repeats itself.

By contrast, inter-project learning has more to do with deliberate capture, dissemination and reuse of knowledge across projects in the organization, in order to avoid repeating earlier mistakes, to improve performance, or to avoid "reinventing the wheel". Inter-project learning is about making the knowledge gained from one project available for the next project and reusing the available knowledge in the organization effectively.

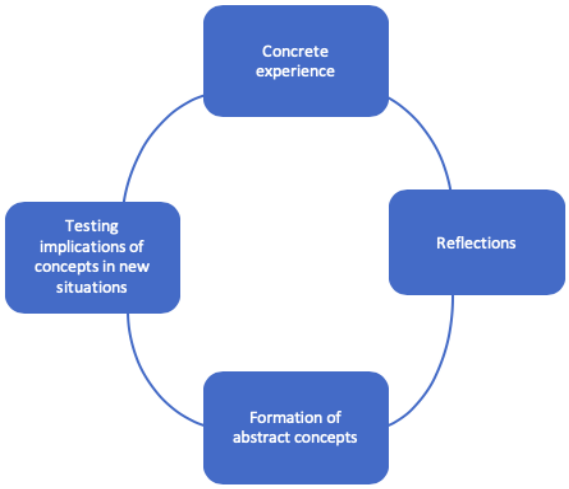

Fig. 1. Experiential learning (Kolb 1984).

2.4 Learning for innovation

With digitalization challenges facing various organization, it is imperative that they equip themselves with various capabilities including both technology and innovation related [69]. Extant studies have identified the existence of a positive relationship between learning and innovation in organizations [3, 70, 71]. A research by Tamayo-Torres et al. [70], confirmed that organizations can innovate in dynamic environments if they have a high learning capability and they further emphasize on the need to encourage learning among employees if the aim is to be innovative. Thus, for an organization to be capable of adapting to the current dynamic business environment, there must be a favorable learning environment [70].

Learning has also been found to increase employees' capabilities and competencies in their work and hence facilitates the generation of new ideas, processes, products and services [72]. As literature indicates, learning can be considered as a pre-requisite for innovation as generating new ideas requires acquiring new knowledge both from within or outside the organization, sharing the knowledge among organizational members and utilization of such knowledge to improve the nature of the existing work processes. Top management support is a crucial factor that facilitates the creation of a good learning environment because if an organization has a shared vision for instance on learning, it will tend to be more innovative [73]. Due to the positive relationship between learning and innovation, this study investigates learning as a pre-requisite for innovation and therefore adopts the term *"learning for innovation".*

3. Method

3.1 Research sample

The aim of the study was to gain insights into project team members' preconditions for learning for innovation from projects in different organizations. Therefore, we targeted employees in several organizations who were at various levels in the organizations and actively involved in projects. There was a wide range of projects involved in the study including; information systems (IS) projects, IT projects, construction projects, administrative projects, engineering projects, product development and research projects. Furthermore, these organizations were from various sectors including manufacturing, education, oil and gas, finance, accounting and banking, engineering and health sectors. Participants were randomly selected from each sector based on work experience (i.e., working years).

The sampling frame used was from a pre-existing database that the authors had kept containing information and contacts of various organizations and professionals that they have previously collaborated in other studies. Although the pre-existing relationship of authors with the organizations and the employees facilitated easy gaining of access of the target participants, it limited the access to more participants outside the database. Furthermore, the pre-existing relationship may have influenced some of the responses and could potentially have impacted our findings. From the existing database, 120 participants were sampled.

3.2 Research approach

The questionnaire consisted of a total of four open-ended questions. The questions aimed at gaining several insights on learning for innovation in the digitalization projects. The questions were designed to collect insights on project team members' perception of learning for innovation, which pre-conditions they consider as enablers for learning for innovation and which hinder them to learn for innovation and how they are able to know if they have actually learned for the purpose of innovating. The questionnaires were sent by e-mail to each participant by the authors. The method was chosen because it enabled coverage of a wide variety of geographically spread participants. Since the participants were all professionals, both the wording and participants' ability to understand the questions was not a major concern. Rather, the concerns were the response time, response rate and the straightforwardness of the questions. To ensure that

the participants' responses would yield useful results, a pilot was conducted which led to some modifications to the questionnaire based on the feedback from the pilot. Subsequently, the questionnaire was sent to all 120 identified participants. To ensure a high number of responses, participants were assured of their anonymity. Follow ups were done through e-mail and phone for a period of one month (March 18, 2020 to April 18, 2020). A total of 97 completed responses were collected. The demographic profiles of the respondents are presented in Table 1. The data was then imported into NVIVO software where coding into relevant themes was done to facilitate performing a qualitative analysis of the data.

Table 1. Demographic profile of respondents

Age		**Work experience**		**Sector**		**Role**	
Range	**N**	**Range**	**N**	**Type**	**N**	**Type**	**N**
20 ≤ – ≤ 29	18	0 ≤ –≤ 5	31	Manufacturing	13	Project manager	21
30 ≤ – ≤ 39	71	6 ≤ – ≤ 10	49	Education	14	Project team leader	13
40 ≤ – ≤ 49	7	11 ≤ – ≤ 15	12	Oil and gas	16	Project team member	21
50 ≤ – ≤ 59	1	16 ≤ – ≤ 20	5	Engineering	19	Project coordinator	12
				Health	15	Project engineer	19
				Finance, accounting and banking	20	Project consultant	7
						Not disclosed	4
Total	**97**	**Total**	**97**	**Total**	**97**	**Total**	**97**

4. Findings

The findings of the data are presented in this section.

4.1 The perception of learning for innovation in digitalization projects

The findings indicated that the majority of participants had adequate understanding on both learning and innovation and the dependence of one on the other. Although the perceptions of learning for innovation among the project team members were fairly similar, there were two viewpoints observed. Some perceived learning for innovation as acquisition of new knowledge, or adding knowledge to what one already possesses;

"means to gain knowledge or skill in something by studying, experience or being mentored"

"is the process of gaining knowledge and skills and putting them to use in our daily lives"

Others associated it with the adoption of a new way of doing things i.e., change in behavior;

"is becoming aware of other means and ways to do what we do in an inclusive, efficient, effective and context tailored manner"

4.2 Enablers of learning for innovation in digitalization projects

When asked on what factors they considered necessary to enable their learning for innovation, four factors appeared to stand out. These were; a supportive work environment, the support of top management, the nature of a job itself, and willingness to learn.

4.2.1 A supportive work environment

Majority of the participants acknowledged that a supportive work environment is necessary to facilitate learning for innovation. For team members to learn, a welcoming environment that supports openness and sharing opinions without fear of being penalized is required. To achieve innovation, there must be an opportunity of trial and error;

"a work environment that does not penalize human error"

"a work environment that is open and allows staff to express opinions with no fear of repercussions"

4.2.2 Support of top management

There was consensus that the support of top management is crucial to enable learning for innovation in an organization. Individual effort without top management approval or support would be in vain since they are responsible for the overall strategic direction of the organization;

"through top management's approval for continuous learning coupled with efforts to create an enabling environment that enhances learning"

"my organization has a budgeted plan to ensure all employees attend different trainings relevant to their jobs"

4.2.3 Nature of the job/task

It was also observed that the nature/ type of job can have influence on people to learn for innovation. For instance, some jobs are more dynamic than others and thus require people to be highly up-to-date with the knowledge change;

"due to the nature of my job, I have to keep up with technology development and dynamics of the oil and gas industry"

However, some people are given more autonomy in their tasks to discover solutions. This facilitates them to learn more during the accomplishment of tasks;

"I learn frequently because I get the opportunity to explore and find solutions to my work-related challenges"

Some jobs are naturally more practical and therefore more engaging which facilitates learning through doing;

"I learn more through doing things in a more practical manner"

Work flexibility can also facilitate learning for innovation as it provides enough time for people to learn new things. For instance, with flexibility in work schedule, employees can attend classes or trainings online that may add value to their work;

"I have managed to learn outside work because of flexibility of my working schedule"

4.2.4 Willingness to learn

Apart from external factors, willingness to learn was observed to be another important enabler. Even if the organization provides all the other necessary enablers, if the employee is not willing then it will all be incapable of producing useful output. There was consensus among the participants on the importance of internal motivation to learn;

"the desire to do better and deliver more efficiently is what motivates me to learn"

4.3 Hinderances of learning for innovation in digitalization projects

When asked on what factors they considered hinderances to learning for innovation, factors mentioned were: internal competition among peers, leadership style that does not support learning, heavy workload, and lack of performance appraisals.

4.3.1 Internal competition among peers

The team members stated that if their peers worked in a competitive manner rather than collaborative, it was likely that learning would be hindered. This is because people tend to hide knowledge from each other instead of sharing it openly. This is a negative attitude which does not support learning among team members and the organization at large;

"skewed competition among peers leading to hiding of particular knowledge from each other"

4.3.2 Leadership style that does support learning

A leadership/management style that does not support learning is a hinderance to learning for innovation. Some participants stated that some leaders can be a hinderance if they take the credit for the work done by their subordinates;

"overshadowing bosses are a hinderance to learning"

Moreover, some participants stated that some leaders/management chose not to support continuous learning of their employees because they fear that once they become more valuable, they may opt to search for employment elsewhere for a higher pay. Although this is a possibility, it also means that there is loss of value which could be attained with more knowledgeable employees;

"top management fears that their staff would leave for greener pastures elsewhere once they are better off"

Leadership style that focuses more on results rather than employee growth does not provide opportunity for team members to learn for innovation. Team members tend to focus on doing only what is expected of them and because they do not feel motivated to learn;

"lack of staff motivation hinders them to involve in learning"

4.3.3 Heavy workload

The participants stated that having a high workload coupled with very close supervision limited their opportunities to learn;

"being overwhelmed with work load is a big hinderance towards learning for innovation"

4.3.4 Lack of performance appraisals

The team members stated that the lack of individual performance appraisals could hinder learning because being faced with learning expectations provide the challenge to learn. Having performance objectives facilitates employees to find different ways to meet and even surpass them, hence learn and innovate during the process. As stated by participant,

"poor learning plans or arrangements hinder our learning"

4.4 Immediate impact/evidence for learning for innovation in digitalization projects

When the participants were asked how they are able to know that they have learned, the results revolved around four factors; work efficiency improvement, change in behavior, problem solving ability and knowledge sharing ability.

4.4.1 Work efficiency improvement

The project team members stated that they can identify they have learned for innovation when they observe a noticeable improvement in their work efficiency. For instance, if they take less time in performing the same amount of work or they become more confident in making decisions related to their tasks;

"when I observe an increased efficiency in my work"

Some participants associated the evidence of learning for innovation with proper resource use in achieving their goals;

"when I can effectively utilize the resources to attain goals"

Moreover, we observed that recognitions from the organization are considered as evidence that they have learnt something new and utilized it differently such that it has been acknowledged;

"when I get recognition from the organization"

4.4.2 Change in behavior

Another factor that enabled the team members to identify that they have learned and are able to innovate is when they noticed a change in their own ways of working (i.e., change in behavior);

"when I am able to do things differently from before"

In addition, they expressed a noticeable change in how others view and treat them pertaining to work related tasks;

"the increasing number of people who need my consultation in their tasks"

4.4.3 Problem solving ability

The team members also stated that when they noticed an increase in their ability to solve problems encountered during the accomplishment of tasks then they know that they have learnt for innovation. Also when their confidence increases such that, they are comfortable to accomplish tasks without fully depending on others;

"when I am able to utilize what I have learnt in solving different problems in my daily tasks"

4.4.4 Knowledge sharing ability

The team members' also stated that when they are able to share knowledge with ease, it is another evidence that they have learnt for innovation. One participant said:

"I know I have learnt when I am able to execute a task and pass the same skills to someone else"

5. Discussion

The aim of this study was to examine the preconditions of learning to facilitate innovation in digitalization projects from the perspective of project team members. Numerous studies have been done on the preconditions of learning, however, not much attention has been done in the current digitalization context, which is the focus of this study.

Our study shows that project team members have a significant understanding and a positive perception towards learning for innovation. This can be attributed to both learning and innovation being commonly used terms in the digitalization context. Moreover, digitalization process facilitates learning and in turn learning leads to the success of digital transformation [14]. In addition, learning and innovation are mutually related i.e., in order to innovate, one requires to learn and through innovation, one keeps learning. This is in line with existing studies [1, 3, 27, 40, 70, 71].

Most of the preconditions found in our study are in agreement with extant studies. For example, top management support has been found to be an extremely critical factor in facilitating learning in dynamic environments [59, 73, 74], which was further proved by our study. To achieve learning for innovation, organizations cannot expect to stick to the old way of doing things. In this respect, leadership plays an important role as they are responsible for ensuring that the necessary factors are implemented [35]. For example financially through investing in trainings, socially through encouraging employees to collaborate and ask for help and strategically through encouraging managers to develop mentoring and learning schemes for their subordinates as supported by Rhoades and Eisenberger [33] and Bassett-Jones [34].

Similarly, individual willingness to learn and a supportive work environment have also been mentioned in several extant literature [4, 24, 25, 35, 40]. Moreover, existing studies suggest that the best way to ensure that new knowledge is created, is for organizations to allow room to put newly acquired knowledge into practice, which is the essence of innovation itself. One way to facilitate this is through having a favorable climate/environment that supports employee practice [35] as this may lead to errors reduction, problems solving, tackling challenges, developing creativity and enhancing motivation. Because this requires putting effort, it can only be achieved if the employees are proactive as stated by Escrig-Tena et al. [29].

The findings of this study are in line with Hussein [40] who emphasizes that for an organizational environment to be supportive of learning in organizations it must have the following characteristics:

- Encourage individuals to recognize their *own limitations and encourage individuals and teams to* seek and ask for help when needed.
- Encourage individuals/team members to avoid being trapped by old habits but to be open to new ideas and concepts.
- Encourage individuals/team members to challenge the established truths, norms and rules.
- Creating a work environment characterized by psychological safety and tolerance for mishaps in order to encourage experimentation, sharing and challenging of the rules, and to find innovative solutions encountered during project development.
- Encourage collective engagement in order to understand the perspectives of the various parties involved in a project.

However, our findings showed that the nature of the task/job as one of the preconditions for learning, that has not been mentioned in the literature reviewed for this study. It is our belief that this factor appeared in this study because of the dynamism of digitalization projects and may therefore be particularly relevant in this context. The demanding

environment compels employees to stay updated to remain valuable and competitive. Although digitalization attracts new opportunities that facilitate effectiveness and add value, it simultaneously disturbs existing operations [75], thus demands employees to continuously keep their knowledge and skills up to date.

Regarding the hindrances of learning for innovation, most factors are relevant to those in existing literature. For example, excessive workload and a leadership style that is not supportive of learning; are commonly known factors in existing literature [76-78]. However, two factors from this study were not observed in our reviewed literature; (i) internal competition among team members and (ii) lack of performance appraisals. In digitalization projects, collaboration is crucial, therefore internal competition should be highly discouraged. Similarly, appraisals are important to evaluate and determine how and where employees are adding value to the overall organizational performance.

Additionally, extant literature has shown the association between employee learning and overall organizational performance [12, 13, 37, 40]. However, our findings also revealed the immediate outcomes/evidence of learning. As mentioned earlier, practice is a significant part of the learning process if innovation is the goal. Evaluations are important because they improve the decision making process [38]. These learning outcomes can only be evaluated after new knowledge has been acquired and acted upon, and new concepts formulated and tested through practice i.e., trial and errors [67]. The improvements observed as a result of such practice are in themselves the essence of learning for innovation. This information can be useful for organizations to assess individual learning of their employees. We therefore suggest that managers/ team leaders to conduct periodic evaluations of their team members' problem-solving abilities, knowledge sharing abilities and work efficiency improvements as this may play a vital role in motivating team members to continue learning.

6. Conclusion

In this article, the preconditions for learning to support innovation in digitalization projects were investigated from the perspective of the project team members. We addressed this through four research questions and our findings revealed the following conclusions:

- The perceptions of the team members were based on two viewpoints; some members perceived learning for innovation as acquisition of knowledge, while others perceived learning for innovation as a change in behavior.
- Willingness to learn, support of top management, a supportive work environment and the nature of the job/task were identified as enablers of learning in digitalization projects. While the three former enablers can be found in several literature reviewed for this study, none mentioned the latter. Our contribution is that, since digitalization projects are characterized by constant change, the nature of the job/task compels people to learn, thus innovate.
- Internal competition from peers, lack of appraisals, leadership that does not support learning, focusing on results rather than growth and heavy workload were identified as hinderances towards learning for innovation. Whereas the latter three are quite common in existing literature, the former two are new contributions in the digitalization context.
- However, it is not sufficient to provide the preconditions for learning for innovation without a means to evaluate if the employees are actually learning. Immediate outcomes of learning were identified as; improvement in knowledge sharing ability, improvement in problem solving ability, improvement in work efficiency and behavior change.

In addition, this study has limited focus on the team members' perception on learning for innovation, further studies can be explored from the management perspective so as to compare the results and identify if there are any major differences in their perspectives.

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PAPER E

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Employee learning in the digitalization context: An evaluation from team members' and project managers' perspectives

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Abstract

The need for learning from individual level to organizational level is essential especially in the current era of digital transformation where adoption to new changes is unceasing. This is because if knowledge is fragmented in the organization, ideas, experiences, and solutions to problems will only be accessible to a certain group of people. The purpose of this study was to conduct an evaluation of the factors that facilitate learning in the digitalization context from the team members' and project managers' perspectives. Critical factors that facilitate learning in digitalization projects were identified from extant literature and categorized into employee, management, and environment related factors. These were evaluated using a questionnaire survey. A total of eleven measurement scales were established using a 5-point Likert scale. The survey was rolled out to 120 participants working in different digitalization projects in diverse industries. The results showed that, although the management related factors appear to have the most influence in facilitating employee learning in the digitalization projects, they are the factors that receive less attention in organizations compared to employee and environment related factors. Moreover, the study shows how management, employee, and environment related factors influence each other.

Keywords: learning; digitalization projects; top management; environment; knowledge

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1. Introduction

There is no dispute that both knowledge and people management are vital for organizational success. However, there is a debate in extant literature as to which between the two is the critical factor to ensure success of digitalization projects. According to [1-3], the ability to bind knowledge to the organization is one of the essential factors that facilitate the successful digital transformation of organizations. On the contrary, [4] and [5] state that, managing people and other organizational changes are critical to ensure success in the digitalization context. With the current changes due to digitalization, organizations need to adopt to new ways of working. These new ways interfere with the normal processes of the organization, thus require a complete shift of mindsets of each individual [5].

Changing employee mindset in an organization is not an easy task. According to [6], 80% of the components that make up the knowledge management strategy are people, culture and process; and are also the most difficult components to manage. Likewise, [7] identified change in the work process as one of the major elements contributing to complexity in digitalization projects. Managing such change requires continuous learning and re-learning from individual level to the entire organization. For the organization to learn, knowledge must first be acquired by the individuals [8, 9]; shared among the people, integrated into the organizational processes and institutionalized [10]. However, because people are the knowledge carriers, it is unfeasible to support that knowledge management alone without people management can facilitate successful digitalization projects. Therefore, this study considers these two as intertwined rather than separate.

There is consensus from extant literature on the factors that facilitate learning in organizations. For example, top management support, training/education, competencies, rewards and recognitions and other incentives, trust and openness, employee attitude and interest, a supportive culture, environment, and structure [3, 11-13] have been discussed extensively. Nevertheless, organizations still face certain issues and challenges related to proper knowledge creation, sharing and integration [1]. Moreover, a study by [14] discovered that the success of digitalization projects is still low and the major cause is that people have a wrong attitude towards change and weak organizational practices.

Although extant literature provides extensive knowledge on the topic of learning in organizations; (i) not much attention has been given on employee learning in the digitalization context, and (ii) various studies have identified critical factors that influence learning in the digitalization context, but there lacks the empirical evidence to understand the extent of implementation of these factors in organizations. This study aims to contribute to extant literature by evaluating the extent to which organizations in the digitalized business environment are implementing the factors that influence employee learning. Therefore, our goal is to answer the question, "*to what extent are organizations paying attention pertaining to implementing the critical factors that facilitate learning in the digitalization projects*?"

The rest of this paper is structured as follows; section 2 presents the theoretical background, section 3 explains the research design, section 4 presents the findings, section 5 presents the discussion and finally section 6 concludes the paper.

2. Theory

2.1. Learning in digitalization projects

Digital transformation (DT) is achieved through digitalization projects (DPs). An organization may undertake several digitalization projects ranging from automation to training workers on the use of computers, but believing that DT is *all* about digitalization is a profound mistake [15]. This is because when it comes to digitalization projects, organizational factors are a major part of it [16].

There is no one acceptable definition of digitalization project as it depends on the context within which the project is undertaken. For instance, [17] defined digitalization projects in the social innovation context as *digitally supported social-innovation initiatives.* Whereas, [18] defined DPs in the education context as *integrating new technologies into their classrooms.* Grahn [19] defined a DPs *as any project involving software or programmable instructions, for example automation projects or projects involving introductions of digital tools.* In another study

conducted in the business context, Sanchez-Segura [14] defined DPs as *part, or one of the projects to be developed in the process, of a whole digital transformation*. Barthel [20] defined DP as *an evolution of technochange projects in that they require more than mere IT implementation, have a high potential to trigger organizational change, and need an integrated view on technology and business.* This study adopts the definition of DP as that by Grahn [19].

2.2. Preconditions for learning in digitalization projects

Various studies have supported the development of a new culture as a pre-requisite for supporting the success of digitalization projects [2] [21] [22]. A new culture results in the need for rethinking the entire workplace including development of new tasks, structures, skills, and competencies. All these aspects require employee learning. Once change occurs, it cannot be absorbed well if not properly communicated to employees [2, 22]. For employees to be motivated to learn and adopt to new changes, they need to know why these changes are important and how they will be useful not only to the organization but to them as individuals. If tasks change, employees require new competencies. Given that the organization provides funding for the employees to gain these new competences, both the organization and the employees gain positively from the change. And the employees are more likely to accept the change. Acceptance is also another important aspect in the success of digitalization projects [23]. It is easier for employees to learn on their own will if they feel that the change is beneficial to them. Therefore, incentives such as rewards, recognitions, funding for trainings and workshops are crucial to enable changes in employee attitudes and behaviors [22].

The readiness of top leaders is another important factor that facilitates successful DPs [2, 21, 24, 25]. The commitment of top leaders plays a crucial role and can be considered as the foundation within which other factors exist [23]. Moreover, [23] states that all these factors do not exist in isolation but are interconnected. For example, a new culture cannot be successfully promoted if the top management is not committed as it requires the implementation of incentives to nudge employee attitude and behavior, developing competencies through trainings which require funding, investing in improving working conditions etc. Collaboration is another important factor [21] as it facilitates the exchange of knowledge within the organization [2]. If top management is not committed to supporting learning, collaboration may not be prioritized, hence knowledge remains to the selected few.

Since learning is influenced by change, the commitment of employees cannot be ignored. This is in line with Newell and Huang who mentioned employee attitude as a strong influence towards creating common knowledge [26]. Likewise, [27] found that the attitude of employees towards adopting a digitalization project positively affects their actual usage of such project. Therefore, the factors that influence the employee commitment towards change especially in the dynamic business environment need to be considered. These were identified as organizational (leadership, opportunities for education) and task characteristics (autonomy, variety, teamwork, feedback, interest, work environment) [28]. Table 1 below summarizes the factors considered critical for supporting learning in digitalization projects:

Table 1: Factors that support learning in digitalization projects

Author	Preconditions for learning in digitalization projects
[24]	• Top leadership will and readiness (commitment) • Rewards and recognition (incentives) • Developing required competencies • Work designed with innovation character
[21]	• Transformational leadership • A corporate culture that unifies all members • A participatory approach (collaboration)
[25]	• Top management commitment/support through building competencies and financing training programs
[2]	• Top management readiness • Creating an innovative environment • Promoting exchange of knowledge within the organization
[22]	• Proper communication

	• Creation of a new culture • Enabling changes in attitudes and behavior of employee
[29]	• Willingness to learn • Top management support • A supportive work environment • The nature of the job/task

3. Method

3.1 Sample

The sample consisted of people working in projects categorized as 'digitalization projects' as per the definition adopted in section 2. These included information systems projects, IT projects, software projects, administrative projects, construction projects, product development projects etc. The target participants were employees at different seniority levels in their organizations but those actively working in projects. Therefore, our sample primarily included project team members and project managers (juniors and seniors). In addition, the organizations were from a diverse range of sectors including manufacturing, education, health, oil and gas etc. The sample consisted of 120 participants. This was done purposely to capture different views from diverse organizations and obtain a general overview that transcends type or nature of organization.

3.2 Survey instrument

A survey instrument was developed based on the factors that support learning in DPs identified from reviewed literature. The aim was to evaluate the extent to which organizations are aware of the factors that support learning in DPs and if they adhere to implementing them in their daily project activities. The factors identified from reviewed literature were grouped into three categories; (i) employees (team members) related, (ii) management related and (ii) environment related factors. This was decided based on the study by [30] who identified that the complexity in similar projects (i.e., DPs) is often created due to the interaction between the people (individuals), the organization (management) and the environment. Measurement scales were developed for each category. In total, eleven (11) measurement scales were developed which would enable to evaluate the extent to which these factors are being incorporated in daily organizational activities. A 5-point Likert scale was used for all measurement scales: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree (see Table 2). The participants were asked to rate the questions in relation to their experience in their organizations.

97 questionnaires were returned comprising of project team members (n=58) and project managers (n=39). This was an 81% response rate. To ensure that the study met ethical requirements, participation was voluntary and adhered to confidentiality. The data collected was then imported to Microsoft excel and formatted, then imported into SPSS statistics package where the internal consistency was checked using analysis of variance (ANOVA) and finally a descriptive analysis was performed.

Table 2: Measurement categories and scale items

Categories	Measurement scales
Employee related	**A: Evaluation of employee (team members) related factors influencing learning in DP** 1. I am eager and willing to discuss and debate with my fellow colleagues and share with them my knowledge 2. I am eager to acquire new knowledge 3. I am open-minded, willing to adapt and change and not stuck to old ideas 4. I am not afraid to ask for help or to admit that I need help in solving my organizational tasks.
Management related	**B: Evaluation of management related factors influencing learning in DP** 5. The senior management encourages us to share and debate and use time on exchange new knowledge 6. Senior management encourages us to search for knowledge outside the boundary of the organization (for example by covering costs associated with attending internal or external programs)

	7. Senior management encourages establishing inclusive work environment. We all feel that we care about each other 8. The senior management is available when I want to discuss my tasks and career in the organization
Environment related	**C: Evaluation of environment related factors influencing learning in DP** 9. People involved in task are co-located i.e., within reach to each other 10. No one is punished for making mistakes during the execution of their task 11. There are a lot of experienced people in my organization who know a lot

3.3. Reliability, validity and generalizability

Overall Cronbach's alpha was calculated as (α =0.895) for all measurement scales which is α >0.8, therefore the scale had a good internal consistency. Since all scales used the same Likert scale, it was anticipated that the individual alphas would not be different. Moreover, our study used face and content validity whereby the measurement scales were closely examined to ensure that they measured what was intended. Considering that these questions were perceptive in nature, generalizability can be difficult to achieve unless in similar environments.

4. Results

Our results show that there is strong awareness by both team members and project managers on the factors that support learning in digitalization projects in all three categories i.e., personal, management and environment. However, the extent of the implementation of these factors differs. It was observed that in general, almost all employees in organizations are willing and committed to learn (over 93%). On the contrary, only top management in some organizations are committed towards supporting learning (over 65%). Similarly, only some organizations have a supportive learning environment (70%).

Table 3: Survey results

		Responses (%)				
Measure	**n**	**SA**	**A**	**N**	**D**	**SD**
1	97	66	25.8	5.2	0	3.1
2	97	90.7	6.2	0	0	3.1
3	97	86.6	9.3	1.0	0	3.1
4	97	68	21.6	2.1	1.0	7.2
5	97	41.2	34.0	13.4	6.2	5.2
6	97	40.2	20.6	18.6	7.2	13.4
7	97	38.1	26.8	21.6	6.2	7.2
8	97	36.1	28.9	22.7	5.2	7.2
9	97	45.4	28.9	18.6	3.1	4.1
10	97	30.9	29.9	19.6	8.2	11.3
11	97	38.1	37.1	12.4	7.2	5.2

All values are represented as percentages (%)
n = number of respondents; SA = strongly agree; A = agree; N = neutral; D = disagree; SD = strongly disagree.

In evaluating the employee (team members) related factors, the results show that 92% of participants agree or strongly agree that they are eager and willing to discuss and debate with their colleagues and share with them their knowledge, 97% of participants agree or strongly agree that they are eager to acquire new knowledge, open-minded attitude, 96% of participants agree or strongly agree that they are willing to adapt and change and not remain stuck

to old ideas, and 90% of participants agree or strongly agree that they are not afraid to ask for help or to admit that they need help in solving their tasks.

In evaluating the management-related factors, the results show that 75% of participants agree or strongly agree that the senior management in their organizations encourages them to share, debate and use time on exchanging new knowledge, 61% of participants agree or strongly agree that their senior management encourages them to search for knowledge outside the boundary of their organization, 65% of participants agree or strongly agree that their senior management encourages establishing an inclusive work environment, and similarly 65% of participants agree or strongly agree that their seniors are open to discuss their tasks and career in the organization.

In evaluating the environment related factors, the results show that 74% of participants agree or strongly agree that the people involved in project work are co-located or within easy reach to each other (physically or digitally), 61% of participants agree or strongly agree that there are no punishments for making mistakes in task execution, and 75% of participants agree or strongly agree that their organizations have many experienced people to learn from. These results are presented on Table 3.

5. Discussion

The results of this study show that the factors that are in control of management are the factors that receive less attention pertaining to learning in digitalization projects. This is quite unexpected based on the emphasis placed on the importance of top management commitment to stimulate learning in DPs [2, 24, 25] [21] [29]. Although the employee related factors are quite critical i.e., employee willingness and commitment to learn [28], learning will not be achieved if the top management are not committed towards building a learning culture. Same holds true for the environment because the environment factors depend on strategies set by top management [21] [2]. These results continue to expound on why the success of digitalization projects is still low [14].

Notwithstanding, our study suggests that environment and personal related factors are highly influenced by management related factors. This is in line with [23] who found that the factors important for the success of digitalization projects are dependent. In addition to the factors being dependent, the management related factors appear as most crucial because they influence directly the personal and environment related factors. This is in agreement with [31] who identified top management commitment as a building block upon which other factors can exist. But surprisingly our findings show that this is the category given the least attention in organizations. For organizations to achieve success in digitalization projects, all three categories need to be considered. It is also important to note that each category contributes differently towards the overall outcome and may require a different level of attention. To examine this better, three outcomes based on focusing on a single category.

a) having employees who are willing to learn, but work in a non-supportive climate and being led by top leaders who are less committed to support learning initiatives.
b) having employees who are unwilling and non-committed, but work in a very supportive climate and being led by top leaders who are less committed to support learning initiatives.
c) having employees who are unwilling and non-committed, but work in a very supportive climate and being led by top leaders who are committed towards learning initiatives.

Option (a) may result in impacting the willingnes of the employees negatively, thus affecting learning negatively. Just because employees are willing to learn, it does not mean that they will. Employees can be committed to learning but may still have the wrong attitude towards change if not properly communicated. Option (b) may influence employees to learn but the impact may become short-lived as the employees lack the internal motivation (willingness) and also the lack of support from top management will eventually lead to negative impact on learning. On the other hand, option (c) is expected to have a positive and lasting influence on learning because top management has the ability to influence both the environment and the employee willingness [31]. This can be achieved through investing in learning initiatives [25], setting strategies and effectively communicating them to the employees [22] [2], provision of incentives [24] [23] etc., This is summarized in Fig. 1.

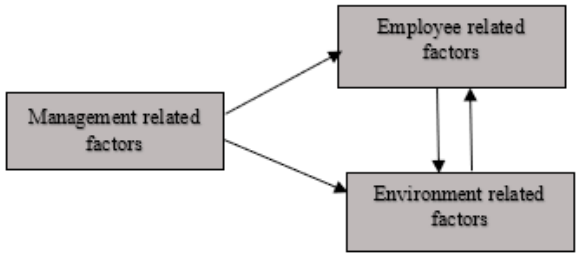

Fig. 1: The relationship between personal, management and environment related factors towards learning

6. Conclusion

In this study, we evaluated the extent to which organizations are paying attention the factors that influence learning digitalization projects. Despite the criticality of management related factors towards creating a learning culture being vastly emphasized in extant studies, it appears to be the category with the least attention in comparison to employee and environment related factors. Identifying critical factors is important, but so is performing evaluations to understand where the loopholes are in organizations so that strategies can be formulated to effectively manage them. Moreover, our results show the influence of these factors on each other and proposed that since management related factors have the most influence, they should receive a higher level of attention in organizations.

This study has some limitations. First, there could be biases with participants scoring the personal-related factors. Second, this study is based on the perspectives of team members and project managers. Future studies can focus on understanding the perspective of top leaders/management to identify if there are similarities and/or differences.

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PAPER F

Exploring the Impact of Absorptive Capacity to Navigate the Challenges of Uncertainty in Digitalization projects

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