

Master of Information Systems (Digital Business Systems)

**Banking on Green Information Systems: An exploratory
case study of a Norwegian bank facilitating
sustainability accounting and reporting**

A report submitted in partial fulfilment of the requirement for the degree of Master of
Information Systems – Digital Business Systems

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Abstract

The purpose of this dissertation is to explore how an incumbent financial institution intend to overcome inhibiting legacy systems to facilitate sustainability accounting and reporting, a relatively new phenomenon in its infancy in IS research. In doing so, this study focuses on two underlying sub-questions covering drivers and inhibitors of Green IS adoption within the Norwegian banking industry, in addition to the facilitation of sustainability accounting and reporting from an IS perspective. The research into these topics is addressed by interviewing six industry-experts within a Norwegian bank, resulting in two aggregated analytical dimensions with valuable empirical outcomes. Findings from this study indicate that regulatory pressure is the most significant driver of Green IS adoption with varying degree of emphasis on stakeholder pressure, economic incentives, and manual processes. Whereas inherent limitations with IT infrastructure and current ESG data deficiencies are identified as inhibiting factors, which subsequently explains the making of an ESG data task force initiative tasked with building an ESG data hub to facilitate sustainability accounting and reporting. The bank's proposed ESG data hub architecture leveraging a PaaS solution provide valuable managerial implications for practitioners in other financial institutions that could opt for a similar Green IS approach.

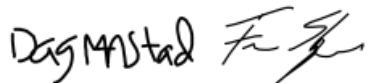
Keywords: Green IS, S-ERP, ESG data hub, Sustainability accounting and reporting, Sustainable finance.

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We certify that the work presented in the thesis is our own unless referenced

Signature:

A handwritten signature in black ink, appearing to read 'Dag M. Stådal' followed by a stylized flourish.

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1. Introduction

In 2020, The European Union (EU) approved the "The European Green Deal", a growth strategy in order to make Europe the first climate-neutral region in the world by 2050 (NHO, 2021). To achieve this goal, the EU is prioritizing sustainable finance. In doing so, the "EU Taxonomy" has been introduced, establishing a classification system that provides a common understanding of sustainable economic activities for investment purposes (European Union, 2021). The EU argues that the taxonomy could provide companies, stakeholders, investors, and policymakers with transparency through proper definitions of the economic activities that are considered environmentally sustainable. Nevertheless, the EU Taxonomy must not be mistaken as a mandatory list of economic activities for investors to invest in, nor does it set mandatory requirements for environmental performance for companies or financial products. However, the EU Taxonomy together with the Corporate Sustainability Reporting Directive (CSRD) will require listed companies and companies with over 250 employees within EU/EEA to disclose their sustainability accounting for the previous accounting year from 2023 and onwards. Considering the short space of time before regulations through EU's taxonomy and CSRD are enforced, companies should already have begun focusing their efforts on facilitating sustainability accounting and reporting that is required under CSRD.

However, based on a recent report by The Governance Group (2021), this is not necessarily the case in practice. Their report has analysed the 100 biggest listed companies in Norway, whereas 38% of the companies were found to lack a climate accounting, and only 10% had acceptable sustainability accounting and reporting in accordance with EU's Taxonomy (The Governance Group, 2021). Thus, indicating there is major room for improvement in which information systems (IS) can play a pivotal role in supporting sustainability accounting and reporting. To address the challenge of sustainability, academia within IS literature has introduced the terms Green IT and Green IS with an increasing focus on how IS can contribute toward a more sustainable world (Murugesan, 2008; Watson, Boudreau, Chen, and Huber, 2008), particularly satisfying the environmental dimension of the Triple Bottom Line (TBL)-framework proposed by Elkington (1998). Economical, normative, and regulative pressures have been cited as the main sources of influence behind Green IS adoption (Chen, Boudreau, and Watson, 2008; Chen, Watson, Boudreau, and Karahanna, 2009). Previous research has identified the economical bottom line in terms of revenue growth and cost reduction to be the main drivers behind Green IS adoption, while regulative pressures were found to have minimal influence (Molla, Pittayachawan, Corbitt, and Deng, 2009; Kuo, 2010). On the other hand, unclear business value and inadequate skill to implement Green IS solutions have been identified as inhibiting factors (Molla, 2009; Molla, Pittayachawan, et al., 2009). One of the objectives of this study is to investigate if that has changed and matured over a decade, in light of regulations such as EU's Taxonomy and CSRD looming on the horizon.

Furthermore, IS enables firms to standardize, monitor, capture, and utilize data (Melville, 2010), facilitating organisation-wide data collection, processing, and sharing (Chen, Boudreau, and Watson, 2008). As a result, IS literature argues that an integrated ERP system is needed for tracking, measuring, and reporting a business's environmental impact and energy consumption (Molla, Cooper, and Pittayachawan, 2009) and therefore key to sustainability evaluation and reporting processes (Chen, Boudreau, and Watson, 2008). This study will investigate if those assumptions from theory are valid and considered in practice. Furthermore, Melville (2010, p. 14) states that IS are “*an important but inadequately understood weapon in the arsenal of organizations in their quest for environmental sustainability by enabling new practices and processes*”. Derived from Green IS research is the concept of sustainable ERP (S-ERP) aiming to contribute to the gap highlighted by Melville (2010) above, in terms of integrating holistic sustainability considerations and activities covering every aspect of the value chain in an ERP system. This case study adopts Loeser's (2013, fig. 1) wider scope of Green IS and considers the concept of S-ERP to be within the realm of Green IS. Although the concept of S-ERP is still in its infancy (Chofreh, Goni, Klemeš, Malik, and Khan, 2020), some research into the topic has been established (Chofreh, Goni, and Klemeš, 2018a; Chofreh et al., 2020; Chofreh, Goni, Shahraroun, Ismail, and Klemeš, 2014). However, existing literature mostly consists of conceptual papers and not empirical research from practice.

Accordingly, vom Brocke, Loos, Seidel, and Watson (2013) stress that we crucially need solution-oriented studies that illustrate how organisations can leverage the transformative power of IS to mitigate negative environmental impacts. Therefore, this study will seek to bridge the gap in academia related to Green IS and the underlying concept of S-ERP through empirical research by conducting an exploratory case study. Thus, contributing to both academia, as well as practice in terms of empirical guidelines for Green IS adoption to facilitate sustainability accounting and reporting, and comply with increasing regulative pressure within the financial industry. Moreover, banks are still employing legacy systems with inherent limitations (Hayretci and Aydemir, 2021) that could inhibit Green IS diffusion, forcing them to overcome legacy systems to facilitate green initiatives. Thus, this master thesis aims to address the following research question while examining two underlying sub-questions:

How do incumbent financial institutions overcome legacy systems to facilitate sustainability accounting and reporting?

R1: *What are the drivers and inhibitors of Green IS adoption within the Norwegian banking industry?*

R2: *How does a Norwegian bank facilitate sustainability accounting and reporting from an IS perspective?*

The following is the structure of this dissertation: First, the method for the theoretical background is explained (2) before relevant theories and concepts are accounted for. Thereafter, the overall method of this study is outlined (3) before presenting the results and analysis (4). Furthermore, the discussion (5) lays the foundation for implications for research and practice (6). Lastly, the thesis presents its limitations (7) forming the section for future research (8), before the conclusion (9) summarizes the dissertation's findings to address the research questions.

2. Theoretical background

There are variations in the use of theory in qualitative research according to Creswell and Creswell (2018). They argue that the key to choosing an approach is to identify how you intend to use the theory in the study, whereas this study will apply an initial up-front explanation of relevant theories and concepts in the following section. To identify and gather an overview of interesting theories and relevant concepts for this dissertation, an initial search typical of a conceptual literature review outlined by Creswell and Creswell (2018) was performed on Google Scholar with a broad search string: “Green IT” OR "Green IS" OR “Sustain* IS” OR “Sustain* ERP” AND "Information systems" AND "Enterprise" OR "Business" OR "Organisation". As a result of the initial search, Green IT and Green IS, Sustainable ERP, critical success factors (CSFs) for Green IS adoption and environmental sustainability were chosen as relevant topics to research more thoroughly and elaborate on in the theoretical background as a basis for addressing the overall research question. In line with the emerging design of qualitative studies (Creswell and Creswell, 2018), the theory presented in the theoretical background was adjusted based on participants’ views and subsequent findings. Thus, it was decided to add theory about the evolution of cloud-ERP.

Considering the theoretical background includes concepts and theories from its infancy where relevant and important research is also published in conference proceedings, it is important to note that there was no restriction set on only journal papers. Allowing to cast a wider net and identify where and when these theories and concepts were established. Therefore, instead of merely gathering literature from the basket of eight IS publications, both conference proceedings and journals were picked and used for the subsequent theoretical foundation. The search within the chosen topics was narrowed down to the three traditional ICT databases of IEE, ACM, and AIS, using more narrow search strings for each field of theory. Whereby papers were selected based on being in the upper echelon of citations, while also evaluating their relevancy from reading the abstract and conclusion. There was also an element of reviewing references in the papers selected to identify research streams and gather fundamental papers within the same field. This was purposely applied when identifying relevant papers on the topic of environmental sustainability, which has been produced outside the natural domain of IS research. For theoretical background, the various theories and concepts identified as

relevant for this case study will be expanded upon below.

2.1 Green IT/IS

Based on the findings from the research method outlined above, sustainability was properly introduced and applied in the context of IS research around the years 2007-2008 with several conceptual and fundamental journal papers (Chen et al., 2008; Murugesan, 2008; Standing and Jackson, 2007). Since then, the topic has only increased in importance through a large number of academic papers (Esfahani, Rahman, and Zakaria, 2015), where the terms Green IT and Green IS have emerged as key concepts.

The term Green IT has been conceptualized in different ways and later expanded upon to be included as a sub-field in the broader scope of Green IS. Firstly, Murugesan (2008) acknowledged how IT, in the same vein as other industries, is a growing and significant part of the environmental problems the global society faces today. Citing that IT infrastructure is contributing to greenhouse gas emissions by consuming vast amounts of electricity still powered by non-renewable energy, as well as posing environmental problems both during production, usage, and disposal. Thus, Murugesan (2008) coined the term Green IT, calling upon the IT industry to green their IT systems, in addition to greening the way they use these systems. He referred to it as environmentally sound IT focusing on energy efficiency and equipment utilization, defining Green IT as: *“The study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems - such as monitors, printers, storage devices, and networking and communications systems - efficiently and effectively with minimal or no impact on the environment”* (Murugesan, 2008, p. 25-26).

Similarly, Elliot and Binney, (2008); Molla, Cooper, et al., (2009); Molla, Pittayachawan, et al. (2009) accentuate the integral part that IT plays in nearly every facet of businesses, as well as the environmental problems that the IT lifecycle from manufacturing to usage and disposal poses. Combining that with the normative pressure of demands from Corporate Social Responsibility (CSR), Molla, Cooper, et al. (2009) argues that sustainability naturally extends to IT under the concept of Green IT. Normative forces, such as CSR, are considered one of three generic sources of influence, including economic and regulative for the adoption of Green IT (Chen et al., 2008, 2009; Molla, Pittayachawan, et al., 2009). That is consistent with several studies that found normative legitimacy in terms of social acceptance to be one of the main motivations for adopting Green IT, but more importantly is the bottom line in terms of revenue growth, reducing costs, and identifying new business opportunities for pursuing Green IT (Kuo, 2010; Molla, Pittayachawan, et al., 2009). On the contrary, the cost of Green IT solutions and unclear business value from green initiatives were found to be the biggest inhibitors of adopting Green IT (Molla, Pittayachawan, et al., 2009), in addition to lack of skill to implement Green IT practices and technologies (Molla, 2009).

Moreover, Watson, Boudreau, Chen, and Huber (2008) argue that while Green IT is mainly focused on energy efficiency, pollution prevention, and equipment utilization, Green IS has greater potential than Green IT because it tackles a much wider problem referring to: *“the design and implementation of information systems that contribute to sustainable business processes”* (Watson et al., 2008, p. 3). Rather than just reducing the energy required to operate information technologies. Furthermore, Watson, Boudreau, and Chen (2010) offer a broader definition of the term Green IS proposing that it is inclusive of Green IT: *“We argue that this exclusive focus on information technologies is too narrow and should be extended to information systems, which we define as an integrated and cooperating set of people, processes, software, and information technologies to support individual, organizational, or societal goals. To the commonly used Green IT expression, we thus prefer the more encompassing Green IS one. Clearly, Green IS is inclusive of Green IT.”* (Watson et al., 2010, p. 24).

Thus, Green IT can be considered as a sub-field of Green IS as illustrated by Loeser (2013, fig. 1). Loos et al. (2011); Molla and Abareshi (2012) offer a similar holistic view of Green IS that is inclusive of Green IT, in which Green IT refers to practices to combat environmental first-order effects of IT production, use, and disposal (Molla, Cooper, et al., 2009; Murugesan, 2008), while Green IS implies deploying information systems to support more sustainable business processes and initiatives through the integration and cooperation between people, processes, software and information technologies (Watson et al., 2008; 2010). Loos et al. (2011) state that Green IS seeks a balance between both reducing the negative environmental impact of a system and the positive effects the system can have in helping to lower the environmental impact of an organisation’s activities.

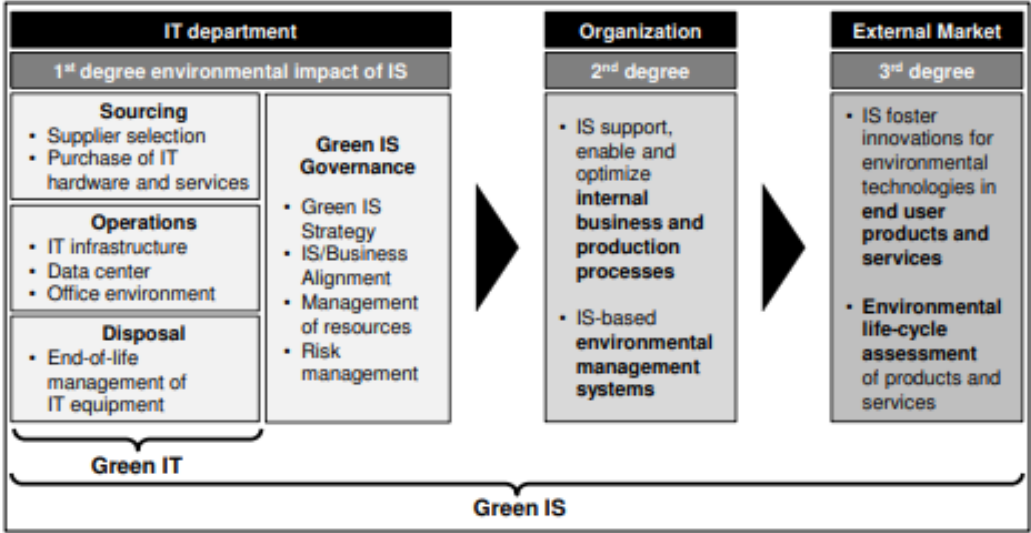


Figure 1. Scope of Green IT and Green IS (Loeser, 2013, p. 6).

2.2 Transformation to cloud-based ERP

For an organisation to function in day-to-day operations and core services, software applications that can carry out various and complex tasks, are considered critical (Srinivas et al., 2015). However, although different information systems perform the functions they were intended to do, some technologies become outdated relative to new laws, competitive pressure, management, or changes in the economy (Ali, Hussain, Ashraf, and Paracha, 2020). An information system that was introduced many years ago but continues to work despite its old technology relative to market conditions, is known as a “legacy system” (Ali et al., 2020).

Some legacy systems are still crucial for certain industry domains. For instance, (Hayretci and Aydemir, 2021) argue that the banking industry still relies on legacy systems, and stress that many large banks are still running on relatively old mainframe solutions due to its critical everyday operation functions, fear of key data getting lost, or the high costs of its replacement. However, scholars underline that various legacy systems also carry issues and point at outdated programming languages, degraded structure, and the lack of necessary architecture to evolve to be common concerns (Crotty and Horrocks, 2016). In line with this, many financial institutions spend a significant amount of their IT budget on maintaining legacy systems (Crotty and Horrocks, 2016). Nonetheless, as a result of a dynamic and increasingly complex business world, scholars claim that organisations are dependent on new information systems (IS) that can manage and integrate important parts of their businesses as well as handle the vast amount of data generated from everyday operations (Srinivas et al., 2015). Thus, Enterprise resource planning (ERP) systems have been a solution for many enterprises. ERP systems are information systems designed to integrate various business processes and functions for organisations to manage daily business activities (Chofreh et al., 2018a; Elragal and Haddara, 2013). Critical organisational tasks such as project management, finance, accounting, human resources, or supply chain operations, are often made up of independent software modules through the ERP software, integrated with a single system with shared data. This creates holistic strategic planning of operations, reduces operating costs, and eases day-to-day management (Madanhire and Mbohwa, 2016).

According to Abd Elmonem, Nasr, and Geith (2016) ERP systems can be separated into on-premise ERP, where the enterprise runs, operates, and manages the system, and hosted ERP, defined as a service provided by a vendor which hosts the physical servers and runs the service. Essentially, a hosted ERP system is a cloud-based solution that with the explosion of cloud computing has been on the rise in recent years. Even though on-premise ERP systems hold their benefits in that enterprises have more control over data, and it provides you with the flexibility to own customized solutions, more companies are moving toward cloud-based ERP systems (Abd Elmonem et al., 2016). Cloud ERP systems are built upon the characteristic of cloud computing and consist of three models: 1) Software as a Service (SaaS), 2) Platform as a Service (PaaS), and 3) Infrastructure as a Service

(IaaS). Scholars argue that due to the number of advantages of cloud-based ERP, being lower costs, regular updates, and less planning and testing, for instance, the majority of ERP system implementations are in the cloud (Bjelland and Haddara, 2018).

There are arguments for how cloud-ERP might be advantageous when considering environmental sustainability. As environmental concerns encourage organisations to choose resources that attain higher environmental performance, there is research that shows that cloud ERP quickens the information transaction procedure and cuts down information loss, resulting in maximizing resources (Ghouri and Mani, 2019). This is consistent with Gupta et al's. (2020) study that emphasizes that cloud ERP not only reduces data losses, but also improves processing time, and reduces the misuse of resources. Additionally, studies show that cloud computing can “*maximize power usage efficiency, improve recycling efforts, and lower carbon and gas emissions*” (Sarkis, Koo, and Watson, 2013, p. 698).

2.3 Sustainable ERP

As with Green IT and Green IS, sustainability within IS has been conceptualized through various terms and theories. The conceptual paper by Standing and Jackson (2007) introduced sustainability into the field of IS, pointing to the many opportunities for the IS function in the drive towards more sustainability, suggesting that IS has a pivotal role to play in addressing sustainability as a global issue. The relationship between IS and sustainability is further underlined by Melville (2010, p. 13): “*From a sustainability perspective, IS enables firms to standardize, monitor, capture, and utilize data and metadata that facilitates energy efficiencies*”. This is supported by the views of Chen et al. (2008) who state that an integrated IS, such as an ERP system, is the key to the sustainability evaluation and reporting processes because it facilitates organisation-wide data collection, processing, and sharing. Thus, IS are required for tracking, measuring, and reporting a company’s energy use and environmental footprint according to Molla et al. (2009). Additionally, most business processes such as manufacturing and logistics would be more aligned with sustainability if the processes were to be automated and integrated (Chen et al. 2008).

Furthermore, scholars in the research field have focused on how sustainability within IS, referring to the design, implementation, and maintenance of information systems contributes to sustainable processes solving sustainability issues (Chofreh et al., 2014). Further research has argued that firms need integrated sustainable IS solutions that can collect, monitor, and automate sustainability information, and a demand for IS that better support corporate sustainability management has, throughout the last decades, come to the fore in IS research (Boltena, Rapp, Solsbach, and Gómez, 2014). In this regard, ERP systems have been suggested as an IS function that can contribute to solving sustainability issues, however, scholars have striven to address how issues regarding

sustainability can be implemented in ERP systems (Melville and Whisnant, 2012). Even though scholars have characterized environmental initiatives through IS as being part of a broader trend toward environmental sustainability through digitalization practices and processes (Melville and Whisnant, 2012), it is not until recent years researchers have sought to investigate the interrelation between ERP systems and sustainability. Accordingly, S-ERP has recently emerged as a topic to address the issues regarding the integration and implementation of sustainable functions in ERP systems (Alfaris, Edikuncoro, Savitri, Yogiari, and Sulistio, 2019).

The concept of sustainable ERP (S-ERP) is derived from Green IT and Green IS, where the latest research is moving in a direction of S-ERP. Chofreh et al. (2014) define S-ERP as “*an information system driven by sustainability considerations that covers all aspects of the value chain. S-ERP systems can be viewed as a holistic, integrative, and complete solution for sustainability business issues*” (Chofreh et al., 2014, p. 4). The researchers apply the TBL as a framework and emphasize that S-ERP systems facilitate environmentally friendly activities by providing complete sustainability data and combining all sustainability information and processes across business functions. This is supported by Alfaris et al. (2019) who underline that the philosophy of S-ERP systems is built upon the TBL. In their study, Chofreh et al. (2014) adopt the research on the value chain creation from Porter and Kramer (2006) illustrating all the different business activities a company engages in, as well as Mentzer et al. (2001) description of internal and external relationships, such as suppliers and customers.

Illustrated with a conceptual model (fig. 2), Chofre et al. (2014) stress the value of including sustainability-related data on all three sustainability aspects: social, environmental, and economic (ESG). The researchers state that for an organisation to perform sustainable practices and processes, a holistic, integrative, and complete view spanning throughout the value chain is required. However, treating business processes through social, technical, economic, and ecological dimensions holistically and in an integrative way is not new (Seidel et al., 2017). According to Seidel et al. (2017) organisations have embraced the principles of the TBL and begun to put together “integrated reports”. Whereas organisations previously produced two distinct reports, one for financials and a separate for sustainability, integrated reporting requires organisations to present a more holistic picture of their actions and strategic efforts that leverage both sustainable and financial data on the same basis. Accordingly, a preliminary study by Hasan, Ebrahim, Mahmood, and Rahman (2017) has found reliable sustainability indicators linked to financial performance. In fact, S-ERP systems supporting these initiatives have been developed by various software vendors, but the implementation process is perceived as demanding by practitioners as there is a limited number of guidelines that provide a course of action to implement the S-ERP system (Chofreh et al., 2018a; Elragal and Haddara, 2013).

The implementation process of ERP systems is considered a complex and challenging operation, often leading to failures and profit loss (Ali and Miller, 2017). Taking sustainability as an additional dimension into an ERP implementation project, one could assume S-ERP to be even more challenging and complicated to implement compared to conventional ERP systems. Nevertheless, scholars emphasize that organisations that recognize and embrace the key drivers for sustainability will reap the eventual rewards of market opportunities and efficient business operations (Hutchins and Sutherland, 2008). In addition, given the global importance of environmental sustainability, the IS discipline has an obligation to make a tangible contribution to one of the most important grand challenges of our time.

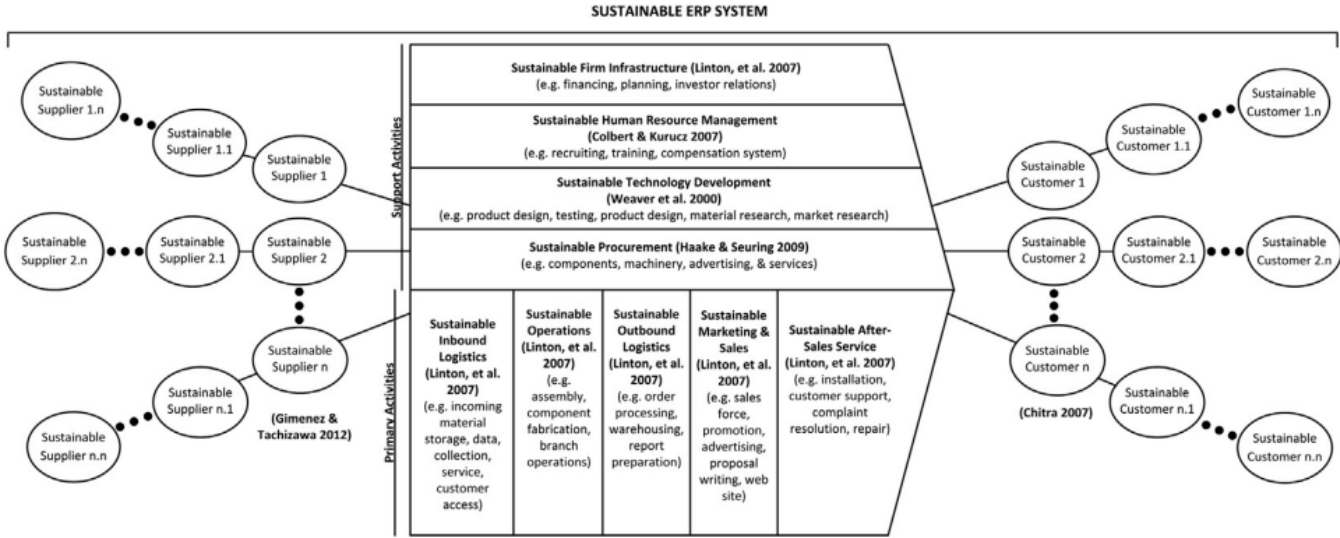


Figure 2. S-ERP system overview (Chofreh et al. 2014, p. 141).

2.4 Critical Success factors (CSFs) for Green IS adoption

The life cycle process from adoption to the retirement of information systems, such as an ERP system, is considered a complex organisational and technological business undertaking (Al-Hadi and Al-Shaibany, 2017), whereas organisations continue to underestimate the scope and complexity of ERP adoption and implementation (Shaul and Tauber, 2013). The concept of CSFs to identify key elements to successfully adopt and implement an ERP system, as well as mitigating the risks involved in its life cycle process was introduced and gained traction in the IS literature around the turn of the millennium (Fui-Hoon Nah, Lee-Shang Lau, and Kuang, 2001; Holland and Light, 1999; Somers and Nelson, 2001). Well-documented traditional CSFs are those of top management support, project champion, business process reengineering (BPR), and project and change management (Fui-Hoon Nah et al., 2001; Holland and Light, 1999; Somers and Nelson, 2001). In the IS literature in general, the term “adoption” has been applied variably by scholars, where some authors perceive it as a final stage in which users accept the ERP system, usually by adopting the technology-acceptance-model (TAM),

while others define it as the preliminary planning phase when organisations choose to invest in an ERP system (Haddara and Zach, 2011).

As the IS literature has evolved, the concept of CSFs has been applied to new phenomena including cloud-based ERP systems (Ahn and Ahn, 2020; AlBar and Hoque, 2019; Haddara, Fagerstrøm, and Mæland, 2015), and more relevant to this dissertation; Green IS (Sahu and Singh, 2016; Singh and Sahu, 2020; 2021) and S-ERP (Chofreh, Goni, and Klemeš, 2018b; Chofreh et al., 2020). Several of these papers have followed the IT adoption framework, technological-organisational-environmental (TOE), to capture different contexts that influence the adoption and implementation of Green IS and S-ERP. Whereas most of the literature on Green IS revolves around its significance on the environmental level (Sahu and Singh, 2016), limited literature is found on factors influencing the adoption of S-ERP specifically. However, there are a few studies (Sahu and Singh, 2016; Singh and Sahu, 2020) that identify efficient and effective CSFs for green IS adoption and implementation. In their case study, Sahu and Singh (2016) examine 19 CSFs and their impact on the implementation process for green IS in organisations. Among the 19 CSFs, the scholars highlight the importance of leaders and top management's obligation to support the adoption of an environmentally sustainable strategy. They also emphasize the value of encouraging the employees in the firm's vision and state that giving them a purpose with the competence enhancement contributes to the implementation process of green IS. On the contrary, their research results indicate that lack of trust, number of workers, lack of expertise, lack of communication, and insufficient financial resources are responsible for the slow growth of green IS adoption in firms.

2.5 Environmental sustainability

Sustainability emerged onto the scene as a hot topic with Brundtland's commission report in 1987, where the term sustainable development was referred to as: "*meeting the needs and aspirations of the present generation without compromising the ability of future generations to meet their needs.*" (Brundtland, 1987, p. 292). She iterated at the time that the present method of development was not sustainable, calling for a different path toward a more sustainable world. Thereafter, academia has helped develop different sustainability frameworks that are applied separately to assist companies in framing their sustainability strategy and communicate sustainability to relevant stakeholders. One of the more notable is the TBL framework introduced by Elkington (1998), which expands on the traditional economic bottom line (profit) to include social and environmental as interdependent dimensions for sustainability accounting. Satisfying all three dimensions constitutes the ultimate goal according to Chen et al. (2008), arguing that the single-minded focus on only economic sustainability can only lead to short-term success, while organisations need to satisfy all three dimensions to succeed in the long run.

Furthermore, to reduce the ecological (environmental) footprint, Hart (1997) introduced three sustainability strategies; pollution prevention, product stewardship, and clean technology. Pollution prevention is about minimizing emissions and waste before it is created, and continuously improving efforts to reduce waste and energy use. Product stewardship not only involves pollution prevention from for instance manufacturing, but also environmental impacts associated with the full life cycle of a product. Lastly, replacing current products and process technologies with cleaner technology to reduce the use of polluting materials and develop environmentally friendly competencies (Hart, 1997).

Moreover, Dyllick and Hockerts (2002) defined three sustainability goals to achieve environmental sustainability; eco-efficiency, eco-equity, and eco-effectiveness. Jenkin, Webster, and McShane (2011) combine the strategies of Hart (1997) with the goals of Dyllick and Hockerts (2002) outlining three guiding sustainability strategies for organisations to adopt to minimize their negative environmental impacts. The first strategy involves the combination of pollution prevention with eco-efficiency: making efficient use of natural and organisations' resources in order to reduce negative environmental impacts. The second strategy combines product stewardship with eco-equity: balancing the firm's and society's short and long-term needs for natural resources (eco-equity) by reducing environmental impacts throughout a product's life cycle (product stewardship). Lastly, the third strategy has the overall goal of stopping environmental degradation altogether: encompasses the former two strategies, as well as integrating environmental sustainability considerations throughout all of the firm's initiatives and activities (Jenkin et al., 2011).

3.0 Methodology

Similar to Oates, Griffiths, and McLean (2022), Creswell and Creswell (2018) outline a framework for a research process. Creswell and Creswell (2018) divides research design into three different approaches; quantitative, qualitative, and mixed-method approach. This study has chosen to take a qualitative approach to address the research question that is exploring the facilitation of sustainability accounting and reporting, an emerging phenomenon within Green IS. Research has stressed that focusing on qualitative research is, within the IS field, an appropriate strategy as it facilitates understanding phenomena through meanings people assign to them (Myers, 1997). The following sections adopt the perspectives of Creswell and Creswell (2018) and present the interconnection of worldview, design, and research method (fig. 3) that serve as the pillars of this study.



Figure 3. Guidelines for research adopted from Creswell and Creswell (2018, p. 43).

3.1 The Constructivist Worldview

Creswell and Creswell (2018) argue that even though philosophical ideas remain largely hidden in research, scholars should explicit the larger philosophical ideas that they endorse, which in turn will help explain the reasoning behind either a qualitative, quantitative, or mixed-method approach for their research strategy. The constructivist worldview express that all knowledge is constructed from human experience as opposed to discovered self-evident knowledge (Botella and Gallifa, 1995). Considering this study seek to explore a relatively new and emerging phenomenon and add to the body of knowledge within IS research through an empirical investigation into individuals' experiences, this fits well with the worldview of social constructivists. As opposed to postpositivist who removes observation from its context and usually perform theory testing through a set of hypotheses, the worldview of social constructivism tries to understand the social context of individuals and how it affects their experiences toward certain objects or things, or as in this context, information systems or other IT artifacts (Creswell and Creswell, 2018). Furthermore, the primary goal of social constructivism is to rely as much as possible on the participants' experiences through their life settings, believing that their subjective meanings and views are simply not imprinted, but rather forged through discussions and interactions with other people (Creswell and Creswell, 2018). Additionally, in order to understand the historical and cultural settings of participants, social constructivists focus on the specific contexts in which the participants work. Hence, this study will focus on a specific industry such as the banking industry, in which sustainability accounting and reporting will have a big impact and shape the participants' work for years to come. Additionally, with Norwegian banks being front runners in corporate social responsibility and sustainability (Norges Bank, 2020), other countries and business branches can, in line with the increasing focus on sustainable finance and the impact of the climate crisis, learn from this study.

3.2 Research design

Within qualitative research, Creswell and Creswell (2018) outline several different qualitative design approaches; Grounded theory, ethnography, and case study among others. This study has chosen the case study as a qualitative design approach.

3.2.1 Case study

For the purpose of obtaining data of value to address the overall research question, we consider a case study the most appropriate research strategy for this study. In line with the constructivist worldview, insights are gathered through investigating a chosen case within its real-life context (Oates et al., 2022). Oates et al. (2022) address that a case study focuses on: *“all the factors, issues, politics, processes and relationships that constitute the messiness of the real world”* (Oates et al., 2022, p. 148) Rashid, Rashid, Warraich, Sabir, and Waseem (2019) supports this assumption and adds that a real-time phenomenon is best examined within its naturally occurring context. According to Oates et al. (2022), a single case study strategy centres the attention on one instance of the ‘thing’ that is to be investigated. This could be an organisation, an information system, or a development project for instance. A studied case can be investigated rigorously using different data generation methods. With the aim of getting a better understanding of information systems’ role in relation to sustainability accounting and reporting which is a relatively new phenomenon, an exploratory case study approach is adopted in this study. An exploratory investigation is applied where a phenomenon is not well understood and where there is a scarce amount of literature on the topic (Neyamini and Moghadam, 2018; Oates et al., 2022). This research is considered to have an exploratory approach as it addresses a research question that has not previously been studied extensively in practice. Furthermore, since the present research aims to explore a phenomenon in the current situation, it is characterized as short-term, contemporary research, where the researcher asks the participants about their experiences on certain topics (Oates et al., 2022).

The potential of carrying out a case study in this investigation lies in that it could generate useful implications for financial institutions and their approach on how to leverage IS to facilitate sustainable accounting and reporting. Furthermore, as reported by the influential financial media house, Financial Times, there are examples of reports emphasizing that a shortage of developers that are operating most bank mainframes will eventually force them to switch to more modernized software solutions (Martin and Tom, 2015). This could lead to the results of this study being generalised to other banks within or outside the Nordics that wish to update or improve their approaches to becoming more sustainable through a Green IS approach. As a matter of fact, although case studies often have been criticised because of the assumed difficulty with generalisations (Ruddin, 2006), Flyvbjerg (2004) stresses that this critique is misdirected. His concept with critical cases, a case with strategic content in relation to the research question, suggests that results in cases that contribute to existing theory, give rich insights, and generate specific implications could be generalised (Flyvbjerg, 2004; Walsham, 1995).

Moreover, studies revolving around other forms of sustainability in different Norwegian industry sectors, such as financial sustainability in various Norwegian industries or social sustainability within Norwegian organisations are well documented (Qureshi, Strønen, Tyseng, and Urdal, 2020; The research council of Norway, 2017). However, to the authors' knowledge, research has yet to explore a

Norwegian bank's adoption and facilitation of sustainability accounting and reporting through a case study, despite Norway's central bank's emphasis on the importance of Norwegian banks' strategy and practices for better climate and sustainability (Norges Bank, 2021). Therefore, carrying out a case study could be appropriate and relevant for various reasons. First, it is expected that banks or other financial institutions attempt to manage their activities with integrity and hold themselves accountable in relation to sustainability and environmental performance (Atmos, 2021). Al Mubarak, Ben Hamed and Al Mubarak (2019) do, in fact, demonstrate in their study that the corporate image of a bank is strengthened when banks adopt activities and business practices related to corporate social responsibility (CSR). Second, CSR has a long history in Norwegian business often referred to as "samfunnsansvar" (Ihlen and Hoivik, 2015), and Norway has been considered and perceived as a pioneer in the field of CSR (Norwegian ministry of foreign affairs, 2009). With banks being central social actors in society, the implementation of IS that facilitates sustainability accounting and reporting can only enhance this perception.

3.2.2 Unit of analysis

As mentioned above, social constructivism seeks to focus on a specific context in which participants work (Creswell and Creswell, 2018). Thus, it was important to narrow the unit of analysis down to a specific industry and geography, but also target a relevant organisation to be able to address the overall research question stated in the introduction. Considering sustainable finance plays an integral part in the EU's Green deal and legacy systems are still prevalent in the Nordic banking industry, a prominent bank in the Nordic financial market was deemed an appropriate case study. Another factor for this choice is that accounting and reporting are already ingrained as critical business areas ensuring the compliance of banks under constant and intense regulatory pressure from authorities within the EU/EEA. Indicating that sustainability accounting and reporting will be top of their agenda for now and years to come.

Another aspect that makes this unit of analysis intriguing is that the applicable bank recently completed separate request-for-information (RFI) and request-for-proposal (RFP) processes with big information systems vendors during 2021 to acquire new ERP (Finance and accounting modules), EPM (Enterprise Performance Management) and EDM (Enterprise Data Management) systems to replace existing legacy systems. This resulted in a deal in principle which was signed in the autumn of 2021, launching a huge and complex information systems journey for this firm that will take many years to complete. Thus, it was deemed interesting to explore their priorities, challenges, benefits, possible pitfalls, and other relevant issues in relation to their implementation project. In addition, within the organisational structure, this study sought to get participants from different hierarchical tiers to obtain various stakeholder perspectives and empirical outcomes.

3.3 Data collection method

The third part of Creswell and Creswell's (2018) research guidelines entails the methods used for data collection, analysis, and interpretation. Prior to the data collection, a spreadsheet was developed to structure and organise the data systematically for later data analysis. This action was beneficial as the spreadsheet tools in Excel provided the necessary functions to visualize and analyse the collected data. Specifically, the spreadsheet included structuring the data into columns of "participants", "reflections", "interesting findings", "concerns" and "future actions", and was used during the interview period. This proved to be an effective way of structuring the data as it gave a general overview of the content of the completed interviews and made possible changes for future interviews clear. In addition, the developed spreadsheet had its advantages by giving insights into how well our questions were performing with regards to the goal of the research, as well through the functions in Excel, making the data manageable using a feasible data display. Structuring collected data prior to further coding is regarded as highly valuable by Ose (2016) who stresses that dividing the data into subtopics releases resources for more thorough analysis, along with providing a good basis for upcoming coding in software programs. The data collection phase of this study lasted from the start of February to the end of March 2022.

3.3.1 Interviews

A case study approach through interviews is, based on the topic and research question, regarded as an advantageous method in collecting data. Considering the social constructivist worldview, Creswell and Creswell (2018) argues that social constructivists individuals seek an understanding of the world in which they live and work and that the goal of the research with a social constructivist worldview is to rely as much as possible on the participants' views on the specific issue being studied. Additionally, the scholars emphasize that including open-ended questions in an interview is valuable, as the participants are then able to explain their life settings while the interviewer listens carefully. Since the study is exploratory this interview approach is also beneficial because it gives the participants latitude to answer in their own way and is especially effective in the early stages of a project as it is valuable in identifying terms, concepts, and terminology the participants use (Mansourian, 2008).

When conducting research based on interviews, various approaches can be explored. In view of this research, a semi-structured interview could be beneficial for various reasons. First, this interview strategy gives the researchers the opportunity to follow a structured list of themes to be covered and questions to be answered. In addition, the semi-structured interview offers the researchers freedom as it enables them to change the order or add questions, depending on the conversation flow (Oates et al., 2022). Basing the data generation on interviews makes the data analysis qualitative. Through the

interviews, the goal is to collect information that gives a better understanding of how a Nordic bank chooses to facilitate its information systems to support sustainability accounting and reporting.

In the process of collecting data, it was also important to consider how the participants should be treated during the investigation Oates et al. (2022). For the purpose of obtaining ethical approval before the research began, the authors applied to NSD (Norsk Senter for Forskningsdata). The approval of the application is attached in appendix A. This was done before conducting the interviews to ensure that sensitive and personal data was managed within their ethical guidelines. The participants were informed verbally about the potential recording of the interviews and its purpose, and thereafter, asked for recording approval before the interview started. Research on ethical challenges in qualitative research states that participants should always be aware of the information that is obtained, and give their consent (Sanjari, Bahramnezhad, Fomani, and Sho, 2014). In accordance with NSD's guidelines, the participants were also given a last opportunity at the end of the interview to delete the entire recording or adjust some parts of the interview.

Lastly, the authors considered developing interview questions in accordance with the participants' various work tasks to be relevant to the study's research questions. Therefore, based on the workers' distinct roles in the Norwegian bank, two different interview guides were first developed; one with questions that related to one employee's work duty, and another that related to the two directors' work duties. However, a third interview guide was prepared for the group of respondents working directly with the ESG data task force, which was discovered during the interview process. Consequently, a total of three interview guides were produced for data collection (Appendix B). In doing so, a five-step process framework by Kallio, Pietilä, Johnson, and Kangasniemi (2016) for how to gain valuable data insight was adopted.

3.3.2 Selection process

The process of selecting sources of data is a crucial element of any social science study according to Marton (2013). One of the main challenges with the data collection phase is finding and selecting relevant participants to address the overall research question. One of the authors is working in the Nordic bank which is the unit of analysis (part 4.2.2), but not with anything related to information systems or sustainability accounting. Thus, we had inside access to an internal discussion forum where fresh news is spread and discussed between employees. Similarly, to the method for theoretical background, the process began by searching with keywords: "Accounting and reporting", "Sustainability", "Information systems", and "ERP" on this forum. The purpose of this was to identify potential participants that worked closely with sustainability accounting and reporting processes that we could target. Coincidentally, there was also a new post about the acquisition of new information systems in the accounting division which was recently shared internally on this forum. This resulted in

three individuals: an employee working directly with non-financial reporting, primarily sustainability accounting and reporting, a director controlling the mandate responsible for the acquisition and implementation of the new cloud-based ERP platform on the business side, and the third person being the IT director responsible for the technical transformation and implementation from the old platforms to the new platform.

In the interview process, the first two participants were helpful in suggesting and recruiting future participants involved with the ESG Data task force initiative, which were considered relevant to further explore the phenomena in question. In fact, Oates et al. (2022) argue that this sampling technique, often termed “snowball sampling”, is useful when the researchers have difficulties gaining access to the target group. Snowball sampling was beneficial as it helped gather relevant and useful data for this research. The following model illustrates the interconnections between the six participants and how they were engaged in this research project, as well as their organisational placement and hierarchy in the Nordic bank:

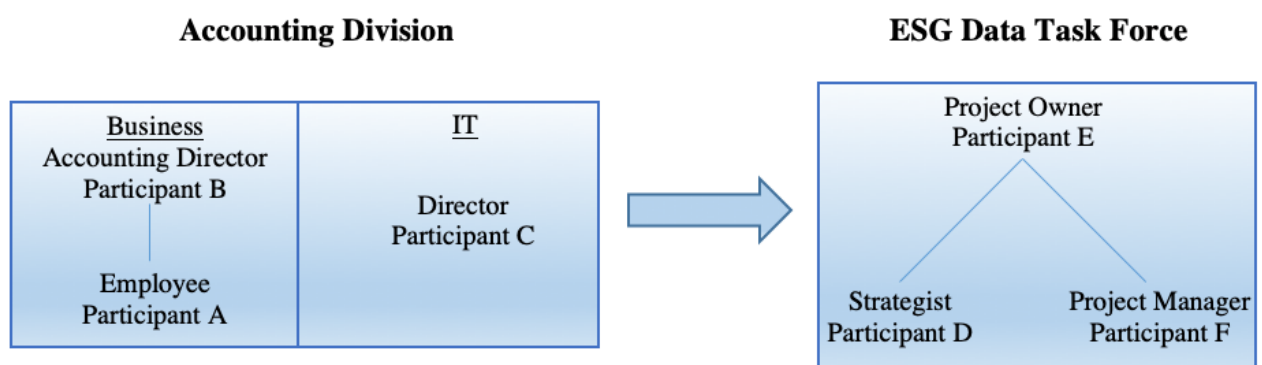


Figure 4. Visualisation of the study’s participants, their work department and working position.

3.3.3 Approaching data saturation

Marshall, Cardon, Poddar, and Fontenot (2013) stress that other than selecting the research topic and research design, obtaining an adequate sample is a fundamental research task in creating credible research. Nevertheless, by examining 83 IS qualitative studies in leading IS journals, Marshall et al. (2013) highlight that there is little rigor in justifying the sample size of interviews within different qualitative IS research approaches, including single case studies. However, the researchers do introduce several best practices for IS researchers to justify their sample size of interviews:

- 1) Data saturation, which is: “when in qualitative data collection the researcher stops collecting data because fresh data no longer sparks new insights or reveals new properties” according to Creswell and Creswell (2018, p. 335).
- 2) Citing sample sizes with similar research problems and designs.
- 3) Citing recommendations by qualitative methodologists.

Adhering to the second recommendation was considered difficult because this study explores a relatively new phenomenon and while covering the theoretical background few studies with similar research problems were found, whereas the few found were conceptual and not similar to empirical case studies. Therefore, this study adheres to the first best practice emphasizing data saturation, in which several studies (Marshall et al., 2013; Marton, 2013) are consistently citing as a key and common criterion when sampling data for a qualitative study. Therefore, at the outset there was no specific goal set for the number of interviews that were required to sufficiently address the research question, hence focusing on data saturation as the data collection phase moved along. Furthermore, as the studied participants are involved in a relatively small team in its infancy working towards the facilitation of sustainable accounting and reporting, there was also a limited number of employees to interview. Consequently, the employees who were considered relevant from the newly established team with respect to the research question and the research objectives were selected.

3.4 Data analysis

3.4.1 Interpretivism

Social constructivism is often combined with interpretivism because the goal of the research is to rely as much as possible on the participants' views of the situation being studied, in turn, such inquiries develop a theory or pattern according to Creswell and Creswell (2018). In accordance with interpretive philosophy, organisational life is socially constructed and economic considerations are secondary (Melville, 2010). Oates (2006, p. 292) defines interpretive research: *“Interpretive research in IS and computing is concerned with understanding the social context of an information system: the social processes by which it is developed and construed by people and through which it influences, and is influenced by, its social setting.”* The essence of interpretivism is to work with subjective meanings acknowledge their existence, understand them, and use them as building blocks in theorizing (Goldkuhl, 2012). Research states that the emergence of new research topics that only can be fully understood if studied in depth, such as organisational and system design or technology development, has led to the emergence of interpretivism in the field of IS research (Silva, Ferreira, Ramos, and Amaral, 2014).

3.4.2 Data preparation

All the conducted interviews were recorded through the recording functions in Microsoft Teams. This was done after obtaining consent from the participants in accordance with NSD regulations. Subsequently, the interviews were transcribed in Microsoft Word using the AI transcription functions. However, due to the risks of misspellings with the AI transcription, the interviews went through a quality assurance with manual transcription in order to ensure that each word was transcribed

accordingly. This is an important step to verify that all mispronunciations, slang, or grammatical errors, that can influence the context of the discussed topic, are included (McLellan, MacQueen, and Neidig, 2003). The transcribed interviews were then saved and stored on Microsoft OneDrive making the data available for forthcoming analysis.

3.4.3 Qualitative data analysis

There is a range of ways to analyse qualitative data, with each approach bringing unique theoretical assumptions and expectations (Lester, Cho, and Lochmiller, 2020). For instance, Miles and Huberman (1994) state that several practices persist across qualitative approaches for analysis, arguing that affixing codes to a set of interviews, noting reflections or other remarks, identifying similar relationships between themes, variables, patterns, and common sequences, are often used methods of qualitative data analysis. The part of qualitative data analysis in this study was inspired by grounded theory using the qualitative analysis techniques and principles developed by Corbin and Strauss (1990), which the researchers considered the most appropriate in light of the exploratory nature of the study and outlined research questions. Corbin and Strauss (1990) provide a guideline for how data can be broken down into manageable pieces, following a conceptualization of the direction of the data points which lays the fundament for finding themes and categories (Packer-Muti, 2016).

Adopting the techniques of Corbin and Strauss (1990) was valuable in the coding process, making the vast amount of textual data more feasible to manage. In doing so, the software program MAXQDA was used to assist in qualitative data analysis. As a method for breaking down and clustering the data, the process started off by coding quotes with similar concepts and themes from different participants together. This resulted in 194 entry-level codes, however, after a second iteration of clustering the data even further, entry-level codes were narrowed down to 158 with 64 unique codes (Appendix C). Those entry-level codes were assigned to different distinct analytical categories such as, “Regulatory pressure”, “Manual processes”, “Lack of ESG data”, “ERP project scope” and “ESG Data Hub”. Furthermore, the analytical categories generated two aggregated dimensions that captured the essence of the entire data: 1) Drivers and inhibitors of Green IS adoption, and 2) Facilitating sustainability accounting and reporting. By taking advantage of the color-coding functions in MAXQDA the two dimensions received their own colour, making extraction of the vast amount of textual data fast and effective. Additionally, the categories connected with the two dimensions received the same colour as the belonging dimension which made the data much more manageable. Based on the analysis and identified patterns, the categorization procedure gave rise to a model adopted from a study by Courpasson and Monties (2017). Their approach became the source of inspiration in the design of two models (fig. 5 and 6) illustrating the process resulting in the two aggregated dimensions generated from the data.

4. Results and analysis

The qualitative data analysis resulted in two separate models (fig. 5 and 6) consisting of one aggregated dimension each. The models are for illustrative purposes and do not include every entry-level code or category, results for each dimension with associated theoretical categories will be presented below.

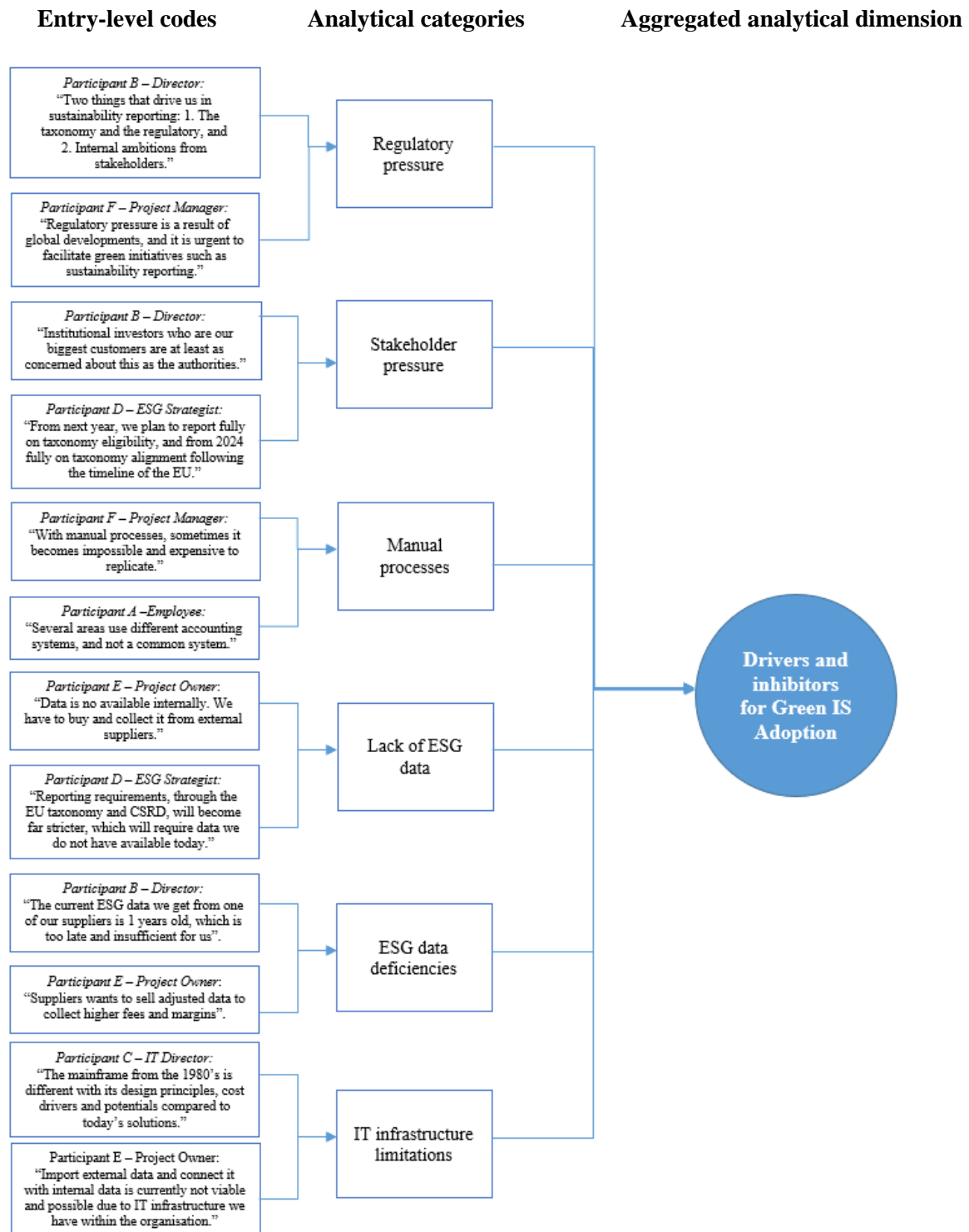


Figure 5. First aggregated dimension with underlying entry-level codes and analytical categories.

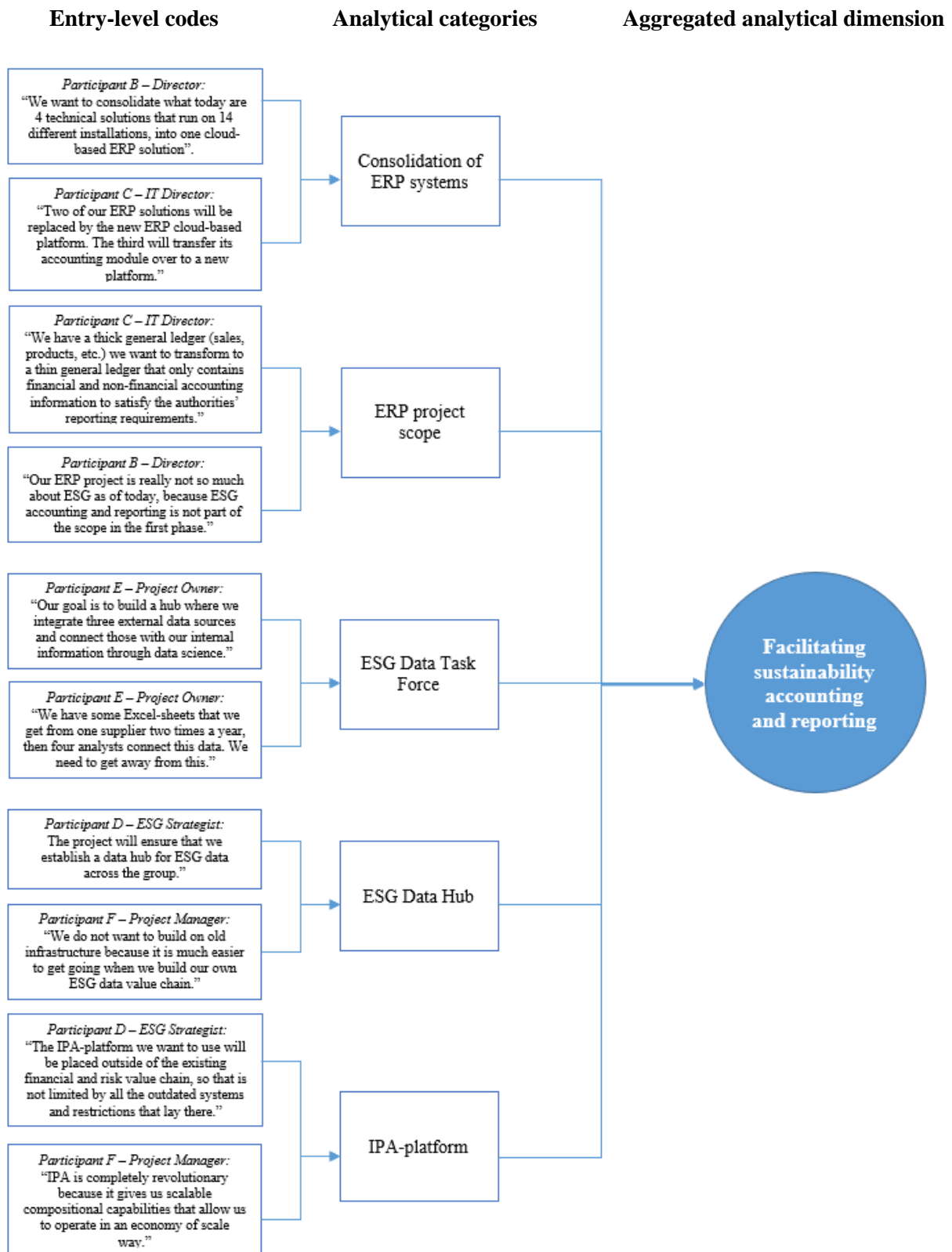


Figure 6. Second aggregated dimension with underlying entry-level codes and analytical categories.

First dimension - Drivers and inhibitors of Green IS adoption

The first dimension that was aggregated based on themes and categories identified in the interviews following the qualitative data analysis is the drivers and inhibitors of Green IS adoption. As evident from the number of categories exemplified in the models (fig. 5 and 6), there are several different drivers and inhibitors that are accentuated by the participants. Those will be presented below.

Drivers

Firstly, a common consensus among all participants is the **regulatory pressures** that drive their work for green initiatives. The director states that there are two main factors that drive them now related to sustainability accounting and reporting: *"In a way, there are two things that drive us now in terms of sustainability accounting and reporting; one is the taxonomy and the regulatory, the other part of it is the internal ambitions from stakeholders"* (Participant B - director). The fast-paced nature of regulations forcing relevant stakeholders to prioritize and work faster is having an effect according to the project manager: *"Now with the regulatory deadline coming and the pace of regulatory change coming in, regulatory pressure is a result of global developments. Now it is urgent to facilitate green initiatives such as sustainability reporting."* (Participant F - project manager). In terms of regulatory pressure, the EU taxonomy is at the forefront of EU's Green Deal and approach toward sustainable finance. It is one of the key regulations that several participants highlight, in which the project owner elaborates on why it will have huge ramifications for the industry: *"The reason why I think the EU taxonomy will be very relevant for the financial industry is because it will be pushed into the regulation of banks throughout the value chain from pension funds to bonds, where the whole industry gets the same regulation across the entire value chain in finance"* (Participant E - project owner). Thus, counteract greenwashing which has become a real issue: *"It has become so within ESG that you can not only say it, but you also must prove it. And if you do not prove it, then you can be sued for lying. Greenwashing"* (Participant E - project owner). He further cites that there is a hedge fund strategy in the US to sue banks that are engaged in greenwashing, and considering they sell bonds in the US they can be sued if they do not take the issue seriously.

Although the EU taxonomy is the most prominent regulation mentioned among the participants, there are a few others as well that will have a big impact on the finance industry moving forward according to the ESG strategist: *"Reporting requirements, especially through the EU taxonomy, CSRD, and CRR with Pillar 3, will be much stricter in the future"* (Participant D – ESG strategist). Corporate Sustainability Reporting Directive (CSRD) is a new EU legislation requiring all large (certain criteria) and enlisted companies to publish reports on their environmentally and socially impacting activities, while Capital Requirement Regulation (CRR) through Pillar 3 regulation is integrating ESG disclosures as reporting requirements. The ESG strategist concretely emphasizes the consequences of stricter regulations and subsequent requirements related to sustainability accounting and reporting,

which is directly linked to their ESG data task force initiative: *"The requirements for auditing sustainability information will also become stricter, and this combined with the new requirements for reporting will require formalized, flexible and robust data value chains for sustainability data"* (Participant D – ESG strategist). In addition, several of the participants refer to the reports of the governing body for financial institutions within the EU/EEA, the European Banking Authority (EBA), for insight into the Sustainable Finance Disclosure Regulation (SFDR) as well as an overview of all regulatory ESG disclosures which are relevant for financial institutions (EBA, 2022).

As mentioned earlier by participant B, the other part that drives them now are the internal ambitions of stakeholders and **stakeholder pressure**. Following up on that he reiterates: *"I would say that those who invest in our bond debt are very concerned with sustainability and these regulations. And other institutional investors who are our biggest customers are at least as concerned about this as the authorities"* (Participant B - director). He further explains how they as a bank have decided to take the position of change, where they will assist customers (both private and corporate) in transitioning from 'brown' and 'dirty' activities such as oil and shipping to green activities and initiatives, rather than just shutting down their source of financing immediately. Instead, incentivising their customers toward more green activities, for instance through green loans that could finance more environmentally friendly shipping boats, contributing to the 'brown' in the taxonomy becoming greener. Additionally, the project manager touches on a similar point of view: *"When we now start to get pressured, not only from the authorities, but especially from investors, then you immediately realize that we must start working faster. And now it has become mainstream, the active investors have reversed the whole strategy at board level and regarding 'brown' companies (oil, shipping, etc)"* (Participant F - project manager). While she further emphasizes the importance of their project tasked with building the ESG data hub in light of the stakeholder pressure: *"Thus, it is important that we have a good data value chain in relation to green volumes. Because this hits us right into our funding, which is the core activity of our bank. If we cannot document and prove that we have funded green activities and initiatives, then we cannot receive any more funding ourselves"* (Participant F - project manager). Moreover, in terms of sustainability accounting and reporting they have set clear goals that align with internal stakeholder ambitions as well as being compliant in accordance with enforced and forthcoming regulations: *"Our ambition is to include a simplified reporting of taxonomy eligibility and alignment in this year's annual report, which is a very conservative estimate due to limited access to data and data quality. From next year, we plan to report fully on taxonomy eligibility, and from 2024 fully on taxonomy alignment following the timeline of EU"* (Participant D – ESG strategist).

Although ESG is an umbrella term for environmental, social, and governance that are all different fields incorporated in regulations and processes surrounding sustainable finance, the director reveals that their focus is more tilted toward the "E" and **environmental risks**: *"There has been a lot of focus on the "S" and social aspect of ESG in our organisation from 2015 and up until now, whereas we now*

see a bigger shift toward the "E" in ESG and environmental risks and impacts from a customer perspective" (Participant B – director). Furthermore, several of the participants underline the physical environmental risks and how those will impact the finance industry: *"Now we see greater impact from physical environmental risks, considering a big part of our portfolio is real estate and housing in which the housing market is used as security for loans. And now with physical environmental risks, we are starting to see that there can be large proportions in value and losses on the housing portfolio. Thus, we need to be better at detecting those risks and adjust accordingly"* (Participant F - project manager). Similarly, the project owner offers context given recent events: *"If you think back to the landslide in Gjerdrum. Aside from the human tragedies, we are not too worried about the houses that were taken by the slide because they are insured. What we are concerned about is the houses that are left surrounding the hole. Because no one wants to live next to such a hole, no matter how much you manage to renovate"* (Participant E - project owner). Illustrating how the physical value can be devalued on a property due to environmental events that will only increase due to climate change, which is problematic for banks using properties or other assets as security for loans.

Therefore, accounting for and mitigating environmental risks are top of their agenda considering there are clear **economic incentives** for them to do so. With an experienced background in risk management, one of the participants most aware and eager to talk about the topic of environmental risks for the finance industry was the project owner: *"Within in all areas that we operate as a bank, we try to define appetite for risk. Because you have to keep in mind that a bank makes money by taking risks. But it is important to know how much risk we want to take, and how much we do not want to take"* (Participant E – project owner). He further explains the relevance of ESG in relation to risk management: *"And a bit of the reason why I started working with ESG is that we saw that climate and environment will have a big impact on risk in one way or another. Be it stranded assets, meaning that you own something that almost overnight becomes of little value"* (Participant E - project owner).

Managing environmental risks is increasingly important for the finance industry as part of sustainable finance, whereby the employee working with sustainability accounting and reporting accentuates both the upside and downside: *"The possibilities are enormous with sustainability accounting and reporting. There is a big upside there, but it is also a huge downside. Because as a bank we are required to report on GAR, and if you have a low rating there, then long-term financing which are used for loans become more expensive"* (Participant A - employee). GAR means green-asset-ratio which is one of the key metrics that financial institutions will be required to report on in accordance with Pillar 3 (CRR) regulations. Not only will it have a huge impact on the cost of financing, but also expose the governance of financial institutions according to the project owner: *"Taxonomy impacts all parts of the value chain. We as a bank sell bonds, and those who buy these bonds will then look at how green we are, because it in turn affects how green they as a buyer become. And there is gunpowder in that because it applies to both bonds and equity. Thus, it impacts the cost of goods to the banks.*

Suddenly you can get cheap funding, or more expensive. Depending on what the portfolio looks like" (Participant E - project owner).

Lastly, our results indicate that existing **manual processes** in relation to sustainability accounting and reporting, combined with the increasing volume and complexity of ESG data are driving the change toward Green IS for more automated and streamlined accounting and reporting operations across the company. All of the participants acknowledge the difficulties and challenges with manual processes, whereby the employee highlights the risk of human errors with the current infrastructure: *"Our company is a result of many acquisitions and mergers, a group consisting of many different units. Therefore, there are several areas that use different accounting systems, and there is not a common system. Then you have to manually enter, validate and correct data, then pass it on. There is always a risk of manual errors"*, while further confirming that human errors occur and are a real problem for them: *"And you see time and time again that some human error occurs"* (Participant A – Employee). Additionally, the IT director clarifies their infrastructure from an IS perspective: *"We have many different ERP solutions on different platforms across our group, which we want to consolidate and modernize to increase flexibility and improve functionality for the users and business units"* (Participant C – IT director).

Moreover, the director describes how their current IT infrastructure is not integrated with sustainability accounting and reporting, which currently only accommodates manual consolidation processes: *"If you look at ESG accounting and reporting then yes, it is manual. ESG data is not integrated with the general ledger, so it has to be structured manually, it does not follow the value chain, but you push it manually around the whole thing, and then you manually enter and consolidate at the top. Because we have a consolidation tool at the top where we can enter everything manually, but it is a completely insane exercise to connect the dots and make it stick together"* (Participant B - director). Furthermore, the employee highlights the silo effects of their current structure and manual processes: *"We often experience when working with monthly, quarterly and year-end report that if there are any corrections during that process, then it is not certain that all processes take it into account because there are different deliveries to different units and different business areas work in different systems"* (Participant A – employee). Increasingly there is also an element of ESG data becoming big in terms of volume, velocity, and variety, posing challenges when the accounting and reporting operations are mainly manual: *"Eventually there is a lot of data when things establish themselves, and eventually there is so much data that it becomes difficult to do it manually, it is resource-intensive"* (Participant B – director). Thus, the project manager stresses the importance of facilitating replicability through automation and streamlining with their ESG data task force initiative: *"And not least that it is replicable. And it is difficult when many of these processes are manual. So sometimes it becomes impossible to replicate and sometimes it is expensive"* (Participant F – project manager).

Inhibitors

There are several inhibitors of Green IS adoption that has been identified throughout the analysis of interviews. The most prominent one and a common denominator among all participants except one is the **lack of ESG data**. The employee working with sustainability accounting and reporting stress that they lack sufficient ESG data and see that as the main obstacle moving forward: *"In relation to sustainability accounting and reporting, the biggest challenges I see is the collection of data and quality of data that we currently lack and will be required to succeed"* (Participant A - employee). In line with the ESG strategist claiming that their sustainability reporting ambitions are conservative due to limited access to data and lack of data quality, the director state that they do not have the necessary data and information about their customers to satisfy both regulatory and internal stakeholder ambitions: *"In terms of ESG and sustainability reporting, we simply do not have the information about our customers that is necessary to report and satisfy the regulatory requirements or as far as the needs we have internally and the overall strategic goals that have been set"* (Participant B - director). Additionally, the project manager not only emphasizes the lack of data, but also how they as an incumbent financial institution historically have struggled with data quality: *"From an ESG data perspective there are huge challenges related to sustainability accounting and reporting due to lack of data. We have gaps to fill, and the boundary between ESG and financial data is still a bit blurry. Financial institutions like ourselves have historically struggled because we are not a technology company yet, and we have struggled with data quality"* (Participant F - project manager).

Considering financial institutions are not producing physical products or raw materials and mainly acting as a third-party and financier of economic activities, their dependency on getting ESG data from external suppliers rather than from within is evident: *"The main challenge with ESG is that we simply do not have the data required. It is not available internally in our organisation. Thus, we must buy and collect it from external suppliers. Then the challenge is to connect the external data with our internal data"* (Participant E - project owner). However, the ESG strategist emphasizes that, owing to stricter regulations requiring more granularity with ESG data, customers will soon be required to provide their own data: *"Reporting requirements, especially through the EU taxonomy and CSRD, will become far stricter in the years to come. This will require a lot of data that we do not have available today for taxonomy-alignment and granular environmental risk data, whereas much of the data needs to be provided by the customer themselves. Which they will be required to do in due time"* (Participant D – ESG strategist). Specifically, that refers to small and medium-sized enterprises (SMEs) initially. Similarly, the division director highlights the gap in ESG data on SMEs: *"Norway is a country with lots of SMEs, none of which are currently affected by the regulatory reporting requirements. Then we have a big hole if we do not collect this data ourselves"* (Participant B – director). However, some of the blame for the inadequacy of ESG data seems to be an absence of a formalized and structured coordination within the company: *"We buy a lot of ESG data today. The problem is that it comes as an*

excel sheet, as an attachment, maybe as an outlook, maybe as a PowerPoint. But it stays there and does not get anywhere” (Participant E – project owner). The ESG strategist further adds to that: *“As of today, most of the sustainability data is in excel, and spread around the group without good coordination”* (Participant D – ESG strategist).

Not only is the lack of ESG data a critical inhibitor, but as already stressed by several participants the ESG data quality has an inhibitory effect on sustainability accounting and reporting. Currently, there are **ESG data deficiencies** that need to improve if they are to satisfy regulations and gain valuable insights that are not outdated according to the director: *“The current ESG data we get from one of our external suppliers for the oil and energy industry is 1 year old. That is actually too late and insufficient for us. We report the quarterly results ten days after the quarterly end. That is the tempo we need, not 1 year delay. Nobody is interested in what happened last year”* (Participant B - director). Moreover, the project owner accentuates issues surrounding external data that they are buying: *“A lot of the data we gather from external suppliers are adjusted in some way or another. Change of raw data, manipulated a little bit. Therefore, we need to be strict regarding only wanting raw data, but the suppliers want to sell adjusted data so they can collect higher fees and margins for their work. But we are looking for raw data so that we can make our own assessments and for traceability reasons”* (Participant E - project owner). Facilitating traceability and thus, increasing transparency in sustainability reporting to avoid greenwashing are also underlined by the project manager and IT director: *“We must develop a methodology for sustainability reporting that is transparent. We must have the ability to adjust and publish our methodology. It is important to avoid greenwashing, therefore we must be transparent”* (Participant F – project manager). They state that regulatory authorities are beginning to demand better traceability when it comes to auditing, whereby they will not only demand aggregated KPIs, but will also retrace the process and examine greater granularity of information: *“Regulators are beginning to demand much better traceability when it comes to auditing. They want to see what detailed data is aggregated up to what; how have you based the qualifications of the data (high risk / low risk), what rules have you run, how have you arrived at that result?”* (Participant C – IT director).

Besides the scarcity and deficiencies with ESG data, there are also **IT infrastructure limitations** in terms of legacy systems that hinder facilitation of green activities such as sustainability accounting and reporting. The director describes the current limitations of their legacy systems constraining their possibilities: *“The bank's current general ledger solution is a mainframe from the 1980s. It is limited to a maximum of 16 strings that cannot be expanded to fit more strings or dimensions that we want to report on, for instance ESG indicators. Therefore, other types of value chains must be established on the outside of the mainframe which in a way are reconciled at different levels towards the main accounting ledger where we have control over the 16 strings and associated transactions”* (Participant B - director). IT director coincides and further explains how the design principles of old legacy

systems do not fit newer regulations and auditing requirements of different authorities: *"The fact that it is old does not mean that it is bad, but the design principles, cost drivers, the potential to further develop it in the 1980s was quite different from today. Today's solutions are designed in a different way. In addition, regulatory authorities, the tax authorities, and many others, have come up with lots of new requirements, which were not in the picture at the time and does not fit the current solution"* (Participant C - IT Director). Furthermore, the ESG strategist points to the lack of a formalized data infrastructure as a big issue considering the bad coordination with ESG data that he mentioned earlier: *"The lack of a formalized data infrastructure is the biggest problem"* (Participant D – ESG strategist). Besides, in light of their ESG data task force project tasked with facilitating sustainability accounting and reporting, the project owner highlights the non-viability of the current IT infrastructure: *"ESG data standalone has no value for us, we must be able to connect it with internal data. To import external data and connect it with internal data is currently not viable and possible with the IT infrastructure we have within the organisation. Both because IT is overworked and has too much else to prioritize, but more importantly it is technically almost impossible"* (Participant E - project owner). Conforming to the same theme is the ESG strategist, stating that the IPA-system they intend to deploy will operate outside of the current financial value chain due to the constraints of its outdated infrastructure: *"It will be placed outside of the current financial value chain such that it is not limited by all the outdated systems and restrictions that lie there"* (Participant D – ESG strategist).

Furthermore, the project manager was the only participant bringing to the fore the challenges and inhibiting factors of **politics and bureaucracy** surrounding new initiatives such as their own in larger organisations: *"There is a lot of politics, even in our organisation there is a lot of politics and bureaucracy. But I'm optimistic about the budget and mandates for our initiative. Since this is such important work, I expect that all business units are prepared to pay and contribute to the ESG Data task force initiative. Everyone must contribute resources to get third-party data or resources to produce something from this. This is very important"* (Participant F - project manager). She further adds how they, historically, have been too dependent on the IT department, thus slowing progress for projects like their own which require IT resources: *"We have experienced historically that the business units have relied too much on the IT department, which in turn slows progress because of politics and bureaucracy"* (Participant F - project manager). Although there was little emphasis on top-management support from other participants, the division director clearly backs the ESG data task force initiative and underlines its importance in relation to sustainability accounting and reporting: *"Now the focus is on connecting ESG data with customer information, that is why the ESG Data task force initiative is so important"* (Participant B – director). Lastly, according to the ESG strategist, the absence of a global standard for sustainability reporting is a key issue moving forward: *"Lack of globally recognized standards for sustainability reporting is a significant problem, to ensure that what is reported is significant, relevant, and comparable across companies and industries"* (Participant D –

ESG strategist). Further citing the need for best practices across companies and industries, while also stressing that EU taxonomy, CSRD, and CRR regulations are only within EU/EEA whereas many financial institutions operate on different continents.

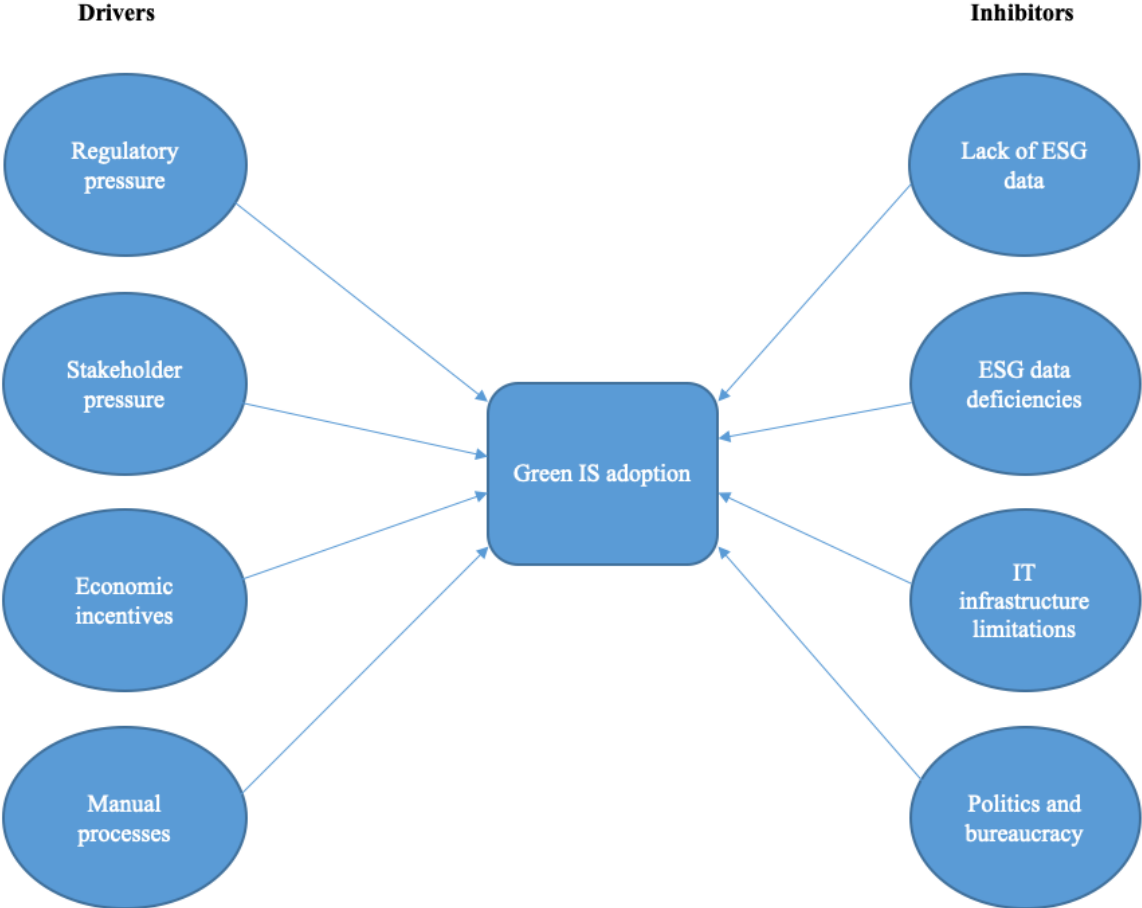


Figure 7. Overview of drivers and inhibitors of Green IS adoption in case company.

Second dimension – Facilitating sustainability accounting and reporting

Both directors provide a lot of insight into their ongoing ERP project, which is their biggest in many years within the accounting division according to the division director: *“The ERP project is the largest project we have run in our division for many years. The last time we ran something similar in size was the consolidation project with SAP in 2014, and before that, it was in the 80's approximately”* (Participant B – director). The director and IT director represent and own the mandate for the business and IT side of the project, respectively. Although representing different perspectives, they are aligned in terms of the overall purpose of the project, **consolidation of ERP systems**: *“What we are working on first and foremost is to consolidate what today are four technical solutions that run on fourteen different installations, into one cloud-based ERP solution. So, the project is about consolidating what is, but not just the existing, because we are looking at opportunities as well. But the main goal is to*

consolidate those into one holistic ERP solution" (Participant B - director). Additionally, the IT director further explains the consolidation of ERP systems: *"Across our group company we have a lot of different ERP solutions running on three different platforms. The oldest is an IBM mainframe, whereas the second that is also starting to get old is Axapta supplied by Microsoft. Both of those will be replaced completely by the new ERP cloud-based platform. While the third is an in-house built platform which is quite modern and will still run core banking applications, but the idea is to transfer the accounting module over to the new platform"* (Participant C - IT director). Although the two directors seem to be aligned now, that was not necessarily the case earlier on in the process according to the IT director. He voiced concerns in relation to the IT side not being involved in the request-for-information (RFI) process and not earlier in the request-for-proposal (RFP) process: *"We on the IT side are not involved in the RFI process at all. We were also not involved early in the RFP process, for example to choose which suppliers we should choose. Neither on all modules and functionality areas that should be checked"* (Participant C – IT director).

Moreover, the IT director goes into more detail about the current infrastructure and how the **ERP project scope** includes transforming that infrastructure: *"In the bank today, we have what we call a thick general ledger with loads of excessive information that got nothing to do with accounting and the authorities are not interested in. While we want to transform that to a thin general ledger that only contains financial and non-financial accounting information to satisfy the authorities' reporting requirements. This means that all the functionality that previously came after the general ledger, it must now come before. We need to build an area before the general ledger at the analytical level, where you can get more details"* (Participant C - IT director). They want performance data and metrics in terms of sales, products, etc to be processed and monitored at an analytical level for business controllers and other relevant stakeholders before the accounting module. However, owing to the IT side not being involved in the RFI-process and not earlier on in the RFP-process, the IT director expresses that defining the exact scope has been complicated. Besides, the division director clarifies how ESG fits into the project scope in the first phase: *"Our ERP project is really not so much about ESG as of today, because ESG accounting and reporting is not part of the scope in the first phase. However, part of the suite that we have bought is about EPM solutions that are consolidation solutions and government reporting such as capital reporting and what then follows from Pillar 3 requirements. Thus also ESG risk reporting, so it will probably be included in the scope at a later stage"* (Participant B - director). Rather than integrating sustainability accounting and reporting in the first phase of the ERP project scope, they have decided to run a separate project paralleled with their own. Hence, the ESG data task force initiative according to the director: *"Now it is about building the data hub for ESG data on our customers and connecting it to our already known internal information. That is where the ESG Data task force initiative is really important. Building an ESG data value chain from the bottom up"* (Participant B - director).

Project owner of the **ESG data task force** further explains the reasoning behind the initiative, citing manual handling of ESG data: *"We have some Excel-sheets that we get from one supplier two times a year. Then four analysts sit and connects this data. That is what we need to get away from. And therefore, after much back and forth, we were able to set up a task force that I own"* (Participant E - project owner). Additionally, he describes the overall goal and purpose of their project: *"Our goal is to build a hub where we integrate three external data sources and connect those with our internal information through data science. Then we will make that data available through an application for any internal stakeholders or business units with ESG reporting requirements or business needs"* (Participant E - project owner). Despite the fact that they presently only have three external data sources for ESG data, the project owner argues that this amount is what they realistically will be able to process and integrate within this year. However, they are looking to integrate more sources of ESG data within other industry segments than the three they have now; properties, shipping, and oil and gas. Thus, the importance of facilitating automated collection of external data is emphasized by the ESG strategist: *"The project will ensure that we establish a data hub for ESG data across the group, which enables automated and orderly collection of external and internal data, structuring of the data, quality assurance and self-service extraction of data for reporting, dashboards and analysis"* (Participant D - ESG strategist).

Moreover, the project manager stress that collecting ESG data from their customers that are SMEs, which is the largest proportion of their corporate customers, will be a key challenge to resolve to get a good measure of key performance indicators (KPIs) in line with sustainability regulations: *"We have a segment that has 'fallen between two stools', and that is SMEs which are neither listed and Nordic. We have a bad database on our European SME customers. Thus, this can have huge ramifications on our indicators such as GAR"* (Participant F - project manager). She also highlights data governance as a priority in their project: *"We need to coordinate the acquisition of third-party data so that most people in our organization can use it. It is important to have data governance in place so that data that you do not have access to is available"* (Participant F – project manager). Lastly, she underlines that they are not a permanent unit as of today and explains what it entails: *"We are a task force, we are not a permanent organization today. And that means in practice that we will not have full operational responsibility for it"* (Participant F – project manager).

As told by several of the participants in the previous segment, they intend to build a data hub that will operate as a centralized **ESG data hub** across the group, that not only the accounting division for sustainability accounting and reporting can benefit from, but also other business units needing to integrate and utilize ESG data. The director of the accounting division stresses that their division is not the only one intended to be benefitting: *"Their project will formalize a data hub that the whole group can benefit from"* (Participant B - director). Due to the inhibiting limitations of the current IT infrastructure, the project owner states that the ESG data hub will be built on the outside of the old IT

infrastructure and its legacy systems: *"The ESG data hub will be built on the outside of the old IT infrastructure in a separate cloud using our IPA-platform"* (Participant E - project owner). Furthermore, the project manager reiterates similar views by highlighting the importance of a low initiation barrier: *"We do not want to build on old infrastructure because it is much easier to get going when we build our own ESG data value chain and rather align it with other relevant initiatives"* (Participant F - project manager). Aligned with the views of both his project owner and manager, however, the ESG strategist also adds that it is necessary for the data hub to integrate and communicate with the financial value chain: *"The IPA-platform we want to use will be placed outside of the existing financial and risk value chain, so that it is not limited by all the outdated systems and restrictions that lie there. But still communicate with the financial value chain in a flexible way"* (Participant D - ESG strategist). They will also build user-oriented applications within the ESG data hub according to the project owner: *"And we will create some apps that we will use to register ESG risk, among other things"* (Participant E – project owner). During the interview with the project owner, he presented a map of their outlined ESG data hub architecture illustrated below:

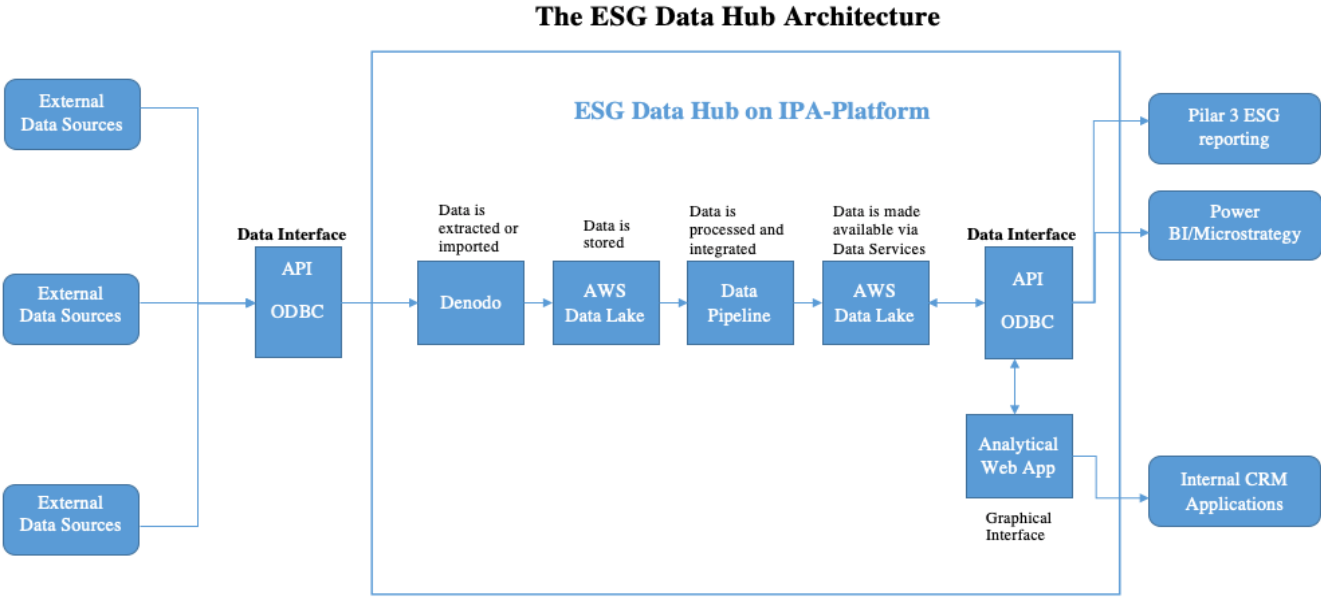


Figure 8. Proposed ESG data hub architecture (Participant E – project owner).

As evidenced above (fig. 8), the entire ESG data hub will be built and operated on their **Insight Platform Analytics (IPA)-platform**. It is a PaaS-solution frequently brought to the fore by the three project members of the ESG data task force as an integral component to build the ESG data hub, whereby the project manager explains why the platform is revolutionary in terms of economy of scale: *"IPA is completely revolutionary because it gives us scalable compositional capabilities that allow us to operate in an economy of scale way. That is one of the main advantages with cloud-based platforms, economy of scale. In practice, this means that you get a lot more out of very little cost"* (Participant F - project manager). Whereas the project owner highlights their familiarity with the

technology and capabilities as key for choosing to utilize the IPA-platform, while also pointing to its strengths in terms of processing and integration of external and internal data: *"The ESG data hub will be built with technology we already have. We have already used the IPA platform for other purposes, so it is not entirely new. The advantage with IPA-platform and the cloud structure is that it is very easy to import internal data and external data and merge it"* (Participant E - project owner).

Furthermore, IPA-platform is described as a universe with a multitude of capabilities that are scalable: *"IPA is a universe that has a number of capabilities. From extraction, storage, processing, data services to analytical applications (...) So you can start small, and expand resources, storage, or processing or whatever when you need it"* (Participant F - project manager). The director also emphasizes the flexibility of cloud-based solutions: *"The ESG data hub is built on Amazon's cloud solution where we can then utilize available capacity when we need it with modern solutions"* (Participant B – director). Despite both the new ERP solution and IPA-platform being cloud-based, there is a difference in terms of the ERP solution being based on Oracle Cloud, while the IPA-platform is based on Amazon Web Services (AWS) according to several of the participants. Both directors acknowledge that this differentiation in cloud vendors can become a challenge further down the line, when integrating the ERP solution with the ESG data hub: *"From a technical perspective, it is also a challenge because Oracle has its own cloud solution that does not operate on AWS or Azure, while the data hub on ESG will run on AWS. Moving large amounts of data from one cloud to another is resource-intensive and not easy, and then you are back to capacity and cost aspects"* (Participant B – director). Similarly, the IT director adds that they will need to find a solution themselves: *"If, for example, we are to take data from Oracle Cloud to another cloud solution or vice versa, then we must take care of that publication ourselves"* (Participant C – IT director).

From an IS point of view, embracing and establishing a culture of continuous improvement and updates that are enforced by a SaaS or PaaS provider is one of the **critical success factors** (CSFs) in utilizing their scalable capabilities according to the IT director: *"By switching to a cloud-based SaaS or PaaS solution, you go to a regime where your provider runs upgrades for you, 3,4,6, etc times a year, it varies a lot. And it is done in such a way that when new functionality is pushed, it is not turned on, so that the user can say "we are only interested in certain functionality". Then you can in the development environment turn on, test processes and integrations, etc. Because when you do this many times a year, it becomes a natural way to live with the system. And these suppliers even have requirements, some of them require you to always be on the latest version, some say that you can be on the penultimate. Then you have to keep up"* (Participant C – IT director). Additionally, the IT director admits they are to some degree guessing what functionality and system requirements that will be needed in 5-10 years' time due to the ever-changing regulatory requirements within accounting and reporting. Therefore, he underlines the significance of scalable capabilities ensuring that they do not

have to start from scratch again and replace entire systems, as they now must with their legacy systems.

To avoid greenwashing, several of the participants emphasize the importance of increased transparency and traceability in relation to sustainability accounting and reporting, whereby the director is among them: *“It is incredibly important that we put in place a transparent, reliable and relevant reporting and measurement of the goals we have set. We can talk about everything we are good at, but we actually have to prove it to the outside world”* (Participant B – director). The IT director provides a hypothetical example to explain why they already now, due to stricter auditing in the future, need to build IT infrastructure for improved transparency and traceability: *“In Norway we have VAT reporting 4 times a year, but it is not certain that it will be like that forever. The tax authorities may come and say “now it's May 27th. We want to see how your tax position is now”. And that will require completely different data value chains, completely different levels of detail, completely different reconciliations”* (Participant C – IT director). Hence, the project manager considers construct validity to be a CSF for their project: *“In the context of ESG, it is important that we focus on what we call construct validity. Do we measure what we really want to measure? Do we use valid KPIs, or do we look at something completely different? And this is very relevant for ESG because sometimes it can happen that we greenwash completely without knowing”* (Participant F – project manager). She further explains how they must approach it from a system perspective: *“No consistent links have been found between financial indicators and ESG indicators, but the approach to finding these links is a bit wrong. We have to think from a system perspective in how we fix the connections, and that is absolutely crucial if we are to find out how things will affect us in the short and long term”* (Participant F – project manager). While also arguing that they need to be able to publish their methodologies for transparency reasons: *“We must develop a methodology for sustainability reporting that is transparent. We must have the ability to adjust and publish our methodology and this is important to avoid greenwashing”* (Participant F – project manager).

Moreover, several of the participants underline the significance of competency and expertise for their projects to be successful. Due to the unfamiliarity with their type of project mandate, the project owner states that they are highly dependent on individuals with cutting-edge expertise: *“We have never done such a project from a technical point of view. We never even thought about it, so we are very dependent on cutting-edge expertise in the beginning before we have built up an acceptable amount of expertise around us. We are very dependent on individuals”* (Participant E - project owner). He further explains their focus on increasing competencies: *“First you have to learn IPA, then you have to learn R and python which we are going to program in. I do not know any of that, mostly finance and numbers. That's why we have to spend a quarter to get our people up to a certain level on the two programming languages, as well as the technologies within the platform. It's a huge lift”* (Participant E – project owner). The project manager stresses the importance of competency in relation to

capabilities and technologies: *“The biggest challenge is to get people to a minimum level of competence so that you can utilize all the capabilities and technologies. And that's why we'll be running an up-skill program at the end of march, which will last a whole week”* (Participant F – project manager). Additionally, the IT director emphasizes the gradual transfer of competency: *“There are consultants who will be hired to help us get this in place. But we have demanded that we should be involved at all times, that we have gradual transfer of competency. That we should take over jobs more and more through the implementation process. We will watch operations and reconfigurations they do in the beginning, then we start doing it while they watch. Then we start doing it alone”* (Participant C – IT director).

Lastly, results also indicate that top-management support is vital considering it is brought to the fore by both the IT director and project manager. The project manager argues the case for their ESG data task force initiative: *“Since this is such an important initiative, it will be important to get enough resources to acquire the necessary ESG data and reallocating employees to work with us”* (Participant F – project manager). Whereas the IT director explains how he prevailed in convincing the top-management to decrease his responsibilities to prioritize the ERP implementation project: *“I used to have a family with 110 employees. Now it is cut to 35-45. And that is precisely because we should be able to concentrate much more on ERP and accounting because I had too much else to do. Impossible to focus on what they asked for. Action was taken when they could not risk that the project of half a billion goes awry”* (Participant C – IT director).

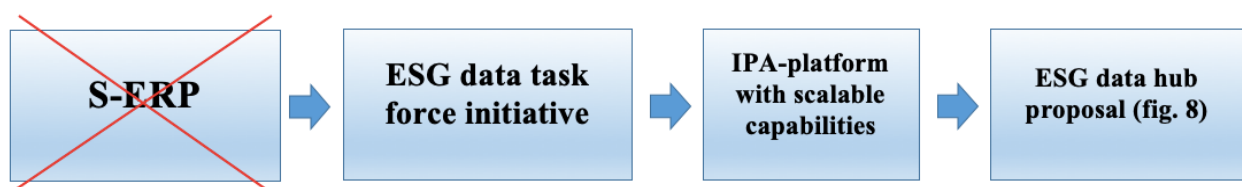


Figure 9. The bank's Green IS approach to facilitate sustainability accounting and reporting.

5. Discussion

What are the drivers and inhibitors of Green IS adoption within the Norwegian banking industry?

To understand the choices the Nordic bank is making related to facilitating sustainability accounting and reporting from an IS perspective, it is important to understand the context in terms of what drives and inhibits their Green IS adoption. Thus, the aim of the first sub-question of this study was to explore and identify key drivers and inhibitors.

At the time of their inquiry, earlier studies cite economic, normative, and regulative pressure as the main sources of influence behind Green IS adoption (Chen et al., 2008; 2009), in which revenue growth and cost reduction were found to be the main drivers behind diffusion, while regulative pressure had minimal influence (Molla, Pittayachawan, Corbitt, and Deng, 2009; Kuo, 2010). That is in stark contrast compared to the results from this study, where the most fundamental driver is regulatory pressure. There is a clear consensus between the participants that regulatory pressure is the main source of influence, and several participants emphasize the urgency to comply with forthcoming regulatory deadlines that are on the horizon. Based on the findings, that is one of the key reasons why they have formalized the ESG data task force initiative to resolve challenges and limitations related to ESG data, manual processes, and IT infrastructure to facilitate sustainability accounting and reporting and other green activities. The major difference in regulatory influence compared to earlier studies could be attributed to the EU's Green Deal not being approved before 2020, in which the EU has since ramped up regulations illustrated by the four pillars of regulations (EBA, 2022) impacting financial institutions within the EU/EEA. Of the four regulatory pillars, the EU taxonomy is the most cited among the participants on all hierarchical levels, whereas the project owner of the ESG data task force initiative stresses that it will have extensive ramifications on the finance industry because it will be regulated into the entire financial value chain, from funding in terms of loans and bonds to pension funds and other capital investments. Some of the participants are positive that the taxonomy and other regulations will contribute significantly toward sustainable finance in accordance with EU's goals, and subsequently counteract greenwashing.

Furthermore, the results indicate that regulatory pressure is already having an effect on reinforcing stakeholders' opinions and ambitions in regard to facilitating green activities. The director, as well as the project members of the ESG data task force, are clearly conscious about satisfying stakeholders' ambitions, which is more in line with normative pressure that is evident and significant in previous research (Molla, Pittayachawan, Corbitt, and Deng, 2009; Kuo, 2010). Interestingly, their views suggest that stakeholders and in particular institutional investors are equally concerned with regulations as authorities, and more importantly, how they as a company will adapt to comply with regulations through the facilitation of green initiatives. Thus, they feel the urgency and importance of building a functioning ESG data hub, which is also reflected with the alignment of their objectives related to sustainability accounting and reporting with both regulations and stakeholders' ambitions. Additionally, it is important to note that the internal stakeholder ambitions are now more tilted toward the "E" in ESG, after the "S" and social aspects of ESG have been top of the agenda for numerous years already with little attention and resources paid to environmental sustainability.

Although the assertion from the director claiming that they are mainly driven by regulations and stakeholder ambitions is largely supported by his colleagues, there is also evidence that accounting for and mitigating environmental risks is playing a critical role due to the underlying economic incentives.

As with stakeholder ambitions, the focus on environmental risks seems to be a ripple effect mostly owing to regulatory requirements through CRR Pillar 3 disclosures on ESG risks. However, several participants acknowledge that due to climate change there are rising levels of environmental risks linked to physical assets they use as security for lending money, a core banking service, whereby two of the participants refer to the consequences of real-life environmental disasters such as the recent Gjerdrum slide and huge flood in Germany. In line with the concerns of the project manager, industry-experts within business brokerage also warn that bad energy classification can make certain properties within their portfolio worthless with new taxonomy regulations (Vidhammer, 2022). Not only could the physical value of their customers' assets decrease drastically resulting in stranded assets, but the project owner also explains how their environmental risk appetite will determine the cost of funding owing to regulations. Therefore, mitigating losses due to stranded assets and avoiding the cost of funding increasing while it is cheap for the bank as of now, are significant economic incentives for Green IS adoption. Similarly, bottom-line considerations have been found to be the main driver of Green IS adoption in earlier studies (Molla, Pittayachawan, Corbitt, and Deng, 2009; Kuo, 2010), however, those are a bit different in terms of revenue growth and cost reduction.

Moving away from normative, economical, and regulative forces, findings from this study indicate that existing manual processes with ESG data handling related to sustainability accounting and reporting are posing challenges that the company feels the need to address. Their current value chain of IS for accounting and reporting is not integrated with ESG data, and consequently, there is a lot of unstructured ESG data that is processed manually in different Excel-sheets. All the participants recognize existing manual processes, whereas the employee working directly with sustainability accounting and reporting cite the risk of human errors and demanding manual consolidation processes due to silos when reporting monthly, quarterly, and year-end reports. On the other hand, other participants highlight the increasing volume and complexity of ESG data that will only make manual processes more resource-intensive. Given the bank's increasingly stringent accuracy and traceability requirements from regulations, it is no surprise that this is unsustainable. In turn, that is driving their change toward Green IS for more automated and streamlined accounting and reporting processes across the firm.

On the subject of inhibitors for Green IS adoption, previous research has pointed to unclear business value and lack of immediate economic gains as barriers (Chen et al., 2009; Molla, Pittayachawan, et al., 2009). Whilst findings from earlier studies regarding inhibitors of Green IS adoption is more about perceptions and motivations, results from the field demonstrate there are more practical barriers that are inhibiting adoption instead of perceived lack of benefits. In fact, practitioners in this Nordic bank are first and foremost highlighting the lack of ESG data and ESG data deficiencies as major obstacles to facilitate sustainability accounting and reporting. All participants stress the scarcity of ESG data indicating that they are aligned from top-to-bottom regarding that being an inhibiting factor for them.

The ESG strategist even claims that their sustainability reporting ambitions are conservative due to being restricted by the limitations with current available ESG data. They and other financial institutions are particularly dependent on external ESG data because they are mainly acting as a third-party and financier of economic activities, rather than producing physical products or raw materials themselves. Paradoxically, the customer segment of SMEs which is the largest portion of their portfolio, is the one they have the least amount of ESG data on. Considering SMEs are not yet targeted by regulations such as EU's taxonomy this seems to be an industry-wide issue. This is consistent with industry-independent experts stressing that financial institutions and other big companies that are regulated by EU's taxonomy cannot fulfil their sustainability reporting requirements without ESG data from SMEs they cooperate with (Eide and Koppang, 2022).

Moreover, some of the participants emphasize current ESG data deficiencies and inadequate data quality to be another key inhibiting factor for Green IS adoption. In terms of data quality, the project manager interestingly attributes that to how they as an organisation have not fully matured as a data-driven company, arguing there is room for improvement related to data management and data science. On the other hand, concerns with ESG data deficiencies are also a theme among other participants, citing both outdated year-old and manipulated ESG data that they purchase from external suppliers. To be able to facilitate sustainability accounting and reporting with better traceability and relevance in accordance with stricter and more demanding regulations, they need both raw and near real-time ESG data.

Furthermore, the cost of Green IS solutions and insufficient skill to implement such solutions and practices have also been identified as inhibiting factors in earlier studies (Molla, 2009; Molla, Pittayachawan, et al., 2009). Even though the bank has never built an ESG data hub before or facilitated ESG data handling from an integrated system perspective, none of the participants are voicing concerns regarding the cost of Green IS or lack of expertise for their implementation project. However, some of the participants do admit they are highly dependent on cutting-edge expertise at this stage. Besides the previously mentioned inhibiting factors, the findings suggest there are existing IT infrastructure constraints in the form of legacy systems that hinder the implementation of green initiatives. Because the current general ledger is a mainframe solution from 1985, it cannot be expanded to enable more dimensions they want to report on, for instance, ESG indicators. The old design principles of legacy systems mean they cannot easily be modified to satisfy newer auditing and regulatory requirements according to the two directors. Additional findings indicate that the project members of the ESG data task force have considered the possibilities to extend and build on the current IT infrastructure of legacy systems, but concluded that it is a non-starter due to its non-viability. That is in line with earlier research stating that legacy systems demonstrate one or more of these characteristics; obsolete languages, degraded structure, limited support capability and capacity, and lacking necessary architecture to evolve (Crotty and Horrocks, 2016).

The last notable inhibiting factor that is identifiable from the interviews is the level of politics and bureaucracy surrounding new initiatives in the bank, including green ones. Considering financial institutions are heavily regulated and there is a big emphasis on governance, it may be impossible to avoid a certain degree of politics and achieve a perfect level of organisational ambidexterity: balancing innovation and efficiency. This could also be somewhat dependent on the size and incumbency of the firm. Nonetheless, insights from the ESG data task force members suggest that they would like an increased level of autonomy with green initiatives. Some frustration related to the absence of a common global standard for sustainability reporting is also relevant to note.

How does a Norwegian bank facilitate sustainability accounting and reporting from an IS perspective?

First and foremost, it is imperative to underline that the findings in this study indicate that the drivers and especially inhibiting factors discussed in the previous section are closely interrelated with the strategic choices they have made in facilitating sustainability accounting and reporting. Thus, some of those findings will also be discussed in relation to the bank's Green IS approach.

Evident from the analysis of interviews is that both directors are the two participants with the most overview and insight into their ongoing ERP implementation project. Previous findings indicate that they are well aware of the inhibiting nature of the current IT infrastructure within the financial value chain, which is consisting of several legacy systems that the IT director coins as "burning platforms" that eventually need replacing sooner rather than later due to a number of factors. Therefore, there is a need to consolidate and modernize their accounting solutions with one holistic ERP solution across their group. Although literature defines ERP systems as an enterprise-wide system that operates through a set of integrated modules supporting an organisation's regular business processes and operations (Bjelland Haddara, 2018), participants in this study use it as a simple term that covers only accounting modules, albeit with additional EPM and EDM solutions that will be phased in at a later stage. As evidenced by the results, the directors stress that their ERP project will be a challenging and complex process in line with previous research (Al-Hadi and Al-Shaibany, 2017; Ali and Miller, 2017), mainly owing to the inherent intricacies of their existing legacy infrastructure. As well as transitioning from on-premises solutions to cloud-based SaaS-solutions which is a completely different IT delivery model, where the ERP vendor will ensure the security and stability on their behalf, including pushing regular updates and newer capabilities (Bjelland Haddara, 2018). The IT director acknowledges that this will require them to adapt if they are to utilize most of the potential of its scalable capabilities.

Furthermore, findings related to the ERP project scope indicate a lack of sustainability considerations that have gone into their RFI and RFP processes. Thus, the accounting director reveals that the ERP project does not encompass sustainability dimensions to facilitate green processes and initiatives in the first phase that will run a couple of years. To determine if their ERP solution fits the term S-ERP it must be driven by sustainability considerations that span the entire value chain according to academia (Alfaris et al., 2019; Chofreh et al., 2014). Although the ERP solution will cover the entire financial value chain across the bank, the absence of support for sustainability activities concludes that it cannot be considered an S-ERP in line with the definition above. The seemingly lack of sustainability considerations could be attributed to the already complex and challenging nature of their project, whereby adding a sustainability dimension without proper guidelines in neither practice nor theory could increase the risk of project failure. Or perhaps the ERP vendor simply did not propose sustainability dimensions in their proposals? This requires further investigation surrounding ERP vendors and how their ERP solutions support sustainability activities. One could ask if the absence of sustainability considerations is a missed opportunity, however, both directors reveal that they at some point will have to integrate ESG data and facilitate sustainability accounting through the classification of customers in their accounting system for instance to issue green loans. Additionally, the accounting director emphasizes that the focus now in relation to sustainability accounting and reporting is resolving the ESG data challenges. That is the main reason why they have decided to run their ESG data task force initiative paralleled with the ERP project, considering the urgent need to satisfy regulatory demands.

The results indicate that both the accounting director and the three ESG data task force members are aligned in terms of the need to build and formalize an ESG data ecosystem to facilitate sustainability accounting and reporting. Furthermore, their perspectives on the initiative's objectives are similar in that they seek to resolve the inhibiting factors surrounding the lack of ESG data and data quality, as well as streamlining and automating the current manual handling of ESG data. Although results suggest that they had no other choice than to build the ESG data hub on the outside of their financial value chain due to current IT infrastructure limitations, it will make it more accessible for other business units to benefit from, not only the accounting division. That is in line with their overall goal of the ESG data hub working as a centralized hub that can be accessible for relevant business units and internal stakeholders across the entire bank. However, an interesting and significant point that both directors bring to the fore is that the ERP solution and ESG data hub will be running on two different cloud platforms; Oracle and AWS. That will naturally pose some challenges down the line if they are to integrate ESG data from the hub with the ERP solution for sustainability accounting. Besides, they are currently working with three data sources involving three different industries, but findings from several participants reveal that there is a gap in ESG data for SMEs. Thus, they will have to find a way to incorporate that in their ESG data collection, perhaps through already established know-your-

customer (KYC) operations that already collect governance data? On the other hand, other practitioners ask what if SMEs cannot deliver ESG data in accordance with the taxonomy, then financial institutions may opt against those in favour of other SME customers (Eide and Koppang, 2022).

As illustrated previously (fig. 8), the project owner presented a complete proposal of their ESG data hub architecture. It outlines the entire ESG data value chain that will be placed outside of the financial value chain. None of the project members goes into detail about how they practically are going to process and integrate the ESG data from external sources, which makes sense considering the interviews were conducted during the first quarter when they were prioritizing onboarding and upskilling, as well as setting up the platform with accesses and more for users. Nevertheless, there is a consensus among the project members and accounting director that the main challenge will be using the hub to connect external ESG data with already known internal customer information. Therefore, finding valid links between financial and ESG indicators are key according to the project manager. However, she argues that no consistent links have been found between financial and ESG indicators. Although a preliminary study has mapped the most frequent sustainability indicators in previous research that could be integrated into an S-ERP system, those are limited to academia and needs to be verified by practitioners (Hasan et al., 2017). Thus, it would be necessary to examine sustainability indicators in relation to Green IS in practice more rigorously.

What we can draw conclusively from the results and ESG data hub architecture proposal is that the IPA-platform is a fundamental component in building the ESG data hub. As opposed to the new ERP system which encompasses off-the-shelf SaaS solutions, the IPA-platform is a PaaS solution that offers more freedom and flexibility that appears to be preferred by the ESG data task force decision-makers. Similarly, both delivery models provide stability, security, and operating systems from the vendors, as well as development and database management tools (Bjelland and Haddara, 2018), but IPA allows them to build and program their own applications. They intend to take advantage of that opportunity to build user-oriented applications within the data hub that could be used for ESG risk disclosures according to the project owner. Considering that they want the ESG data hub to be operating as a centralized hub that benefits a wide scope of business needs across the whole group, the duality and flexibility to both process data and in turn leverage it in specialized applications can be considered a CSF. Besides their familiarity with the platform and available technology, scalable capabilities appear to be the most prominent CSF highlighted among the participants. The scalable capabilities purposefully provide economy of scale, whereby several participants emphasize the flexibility to expand capacity and resources to suit their needs on the platform as highly important.

Due to regulatory pressure demanding greater traceability and transparency to avoid greenwashing, findings indicate that construct validity is a CSF for their green IS initiative. Construct validity may be

of even greater importance with sustainability reporting compared to financial reporting, because with the latter there is only financial data to handle, while sustainability reporting requires combining several different types of data. Thus, from a system perspective they will have to build an infrastructure for increased traceability and consider how to incorporate and process several types of data; ESG, financial, and customer data. To succeed with that, results suggest that they are highly dependent on cutting-edge expertise to build the ESG data hub, consistent with previous research that highlights the need for IT experts as a CSF for Green IS adoption (Sahu and Singh, 2016).

Additionally, lack of training to build competencies is also identified as an inhibiting factor (Sahu and Singh, 2016), whereas the ESG data task force are intent on prioritizing building competency among the project members. A mitigating factor here could be, based on indications from participants, that it is easier to onboard and learn the new IPA platform than the intricacies of legacy systems with obsolete programming languages. Top-management and financial support have also been identified as CSFs for successful Green IS adoption (Sahu and Singh, 2016), similarly, the project members are emphasizing the same if the initiative is to achieve its main purpose as a company-wide distribution hub. There is seemingly no lack of top-management support from the accounting director, and they have already been given large sums to buy external ESG data. However, findings indicate that they would require more moving forward, but politics could be an inhibiting factor hampering company-wide coordination.

6. Implications

6.1 Implications for research

Through conducting a qualitative case study exploring the facilitation of sustainability accounting and reporting within a prominent Nordic bank, this thesis contributes new insights into Green IS from a practical standpoint that has implications for research. Whereas past research into Green IS (Chen et al., 2008, 2009; Murugesan, 2008; Standing and Jackson, 2007; Watson et al., 2008, 2010) and the underlying concept of S-ERP (Chofreh et al., 2014, 2018b, 2020) has mostly been introductory and conceptual papers laying the foundation for future research directions, this study offers empirical outcomes formed by practitioners and industry-experts. As a result of examining the drivers and inhibitors of Green IS adoption in practice, researchers are able to identify practical drivers and barriers that add context to the choices practitioners make in relation to Green IS to facilitate green initiatives, rather than merely establishing perceptions and motivations (Kuo, 2010; Molla & Abareshi, 2012; Molla, Pittayachawan, et al., 2009). To evolve the research field of Green IS, there is a need for similar empirical studies into the adoption and implementation of Green IS to address the gap in solution-oriented studies in academia. Thus, the qualitative research approach of this study can serve

as inspiration for other researchers that seek to gain empirical outcomes for the practical facilitation of Green IS activities such as sustainability accounting and reporting.

While previous studies within Green IS have been more focused on the first and second sustainability strategies that encompass pollution prevention and product stewardship to directly reduce environmental impacts (Jenkin et al., 2011), little attention has been paid to the third strategy which also includes how companies can indirectly contribute to environmental sustainability. A financial institution that mainly operates as a third-party financier and service provider cannot directly reduce environmental impacts to the same degree as a traditional manufacturer of physical products and raw materials. However, the EU still believe that sustainable finance will play an integral role to become a climate-neutral region within 2050 (NHO, 2021) by demanding greater transparency through sustainability accounting and reporting to avoid greenwashing. Findings indicate that several of the participants believe the same. Therefore, this case study emphasizes the importance of considering the perspective of financial institutions in Green IS research, and not constraining it to only industries that can directly reduce environmental impact.

6.2 Implications for practice

IS literature argues that an integrated ERP system is essential for tracking, measuring, and reporting a company's environmental impact and energy consumption (Molla, Cooper, et al., 2009), and is thus critical to the sustainability evaluation and reporting processes (Chen et al., 2008). This study does not support that notion; that an integrated S-ERP system is the one and only approach to facilitate sustainability accounting and reporting processes. On the other hand, this research point to a lack of sustainability considerations related to an ongoing ERP project for it to be considered an S-ERP solution, although they plan to integrate ESG data at a later stage. Therefore, the concept of S-ERP cannot necessarily be generalised to financial institutions. However, when deciding upon key strategic IS choices for green initiatives, this study shows that companies must consider and navigate their own inhibiting factors and practical barriers, which may vary among industries and companies. For financial institutions that are dependent on external ESG data, findings suggest that they will have to find a solution to fill the gap of ESG data on SME customers. For instance, through already established KYC operations that are ingrained in banks' operations.

Due to the limitations of existing legacy systems in the banking industry, the case company has decided to build an ESG data hub separately from the traditional financial value chain. In addition to the challenges surrounding external ESG data, the Nordic bank has chosen a more flexible approach with the IPA PaaS solution that illustrates how other financial institutions faced with similar Green IS adoption barriers can approach it, as opposed to an S-ERP with embedded SaaS solutions that could be too rigid for the ever-changing and increasingly stricter regulatory sustainability requirements. That

could prove to be a sensible approach considering the business needs requiring ESG data will likely evolve tremendously over the next decade. Thus, the flexibility and scalable capabilities of IPA and similar platforms will be important to succeed in the facilitation of sustainability accounting and reporting. Nonetheless, practitioners will need to embrace a culture of continuous improvements to achieve economy of scale. Finally, owing to regulatory pressure demanding greater traceability and transparency to avoid greenwashing, findings from this study suggest that financial institutions should emphasize construct validity and building competencies as CSFs to succeed with sustainability accounting and reporting.

7. Limitations

Although the presented thesis carries informative and practical implications, it also holds various limitations. First, because the conducted study is exploratory and covers the preliminary phase of a green initiative, it only showcases how the bank intends to facilitate sustainability accounting and reporting, which represents a limitation as the results are considered tentative. This stands in contrast with an explanatory research approach which would have investigated how their design and infrastructure choices related to green initiatives had performed. However, considering the bank's project is in its early stages, this became impossible to address. Additionally, because of the preliminary phase of their initiative, this study was not timely enough to interview data scientists or analysts to investigate in-depth the viability of capabilities on the IPA-platform. For future studies, this would have enhanced the end-user perspectives. Another consequence of the exploratory approach is that it generates qualitative data, that might be challenging to interpret. This can lead to the qualitative data interpretation being biased or judgemental. In addition, the length of the participants' knowledge or experience with the new project might also have had an effect on their responses. Nevertheless, concepts and subjects discussed through the interview process were examined and analysed in order to avoid any misconceptions. Moreover, as a consequence of the design of the research, being a case study, the thesis is limited to only one industry in one country. The study does not investigate the differences or similarities between banks in Norway or other countries, or how other industries outline their business strategies within Green IS towards a more sustainable approach. Thus, due to the relatively specific nature of the studied case, one can probably only generalise the results to other financial institutions within the same identified geographical region that are dependent on external ESG data for sustainability accounting and reporting.

8. Future research

In light of this qualitative case study, there are several possible research avenues that would be interesting to investigate for future research. Firstly, as the research into the relatively new

phenomenon of Green IS supporting sustainability accounting and reporting evolves and becomes more established, it is necessary to conduct more explanatory studies and not only exploratory ones. Thus, it will be possible to document how successful the strategic Green IS choices have been and increase the reliability of managerial implications. Secondly, the participants, specifically the accounting and IT director, gave only glimpses of insight into what sort of functionality their ERP solution could possibly be provided with to support green processes. Therefore, it would be useful to examine vendors' perspectives, exploring how the cloud-based ERP solutions of the biggest vendors such as SAP, Oracle, IBM, and Microsoft are suited to facilitate sustainability accounting and reporting or other types of green activities. The level of insight could be even more valuable if vendor perspectives were combined with end-user perspectives, to determine the actual viability of their solutions as well as acceptance among end-users with ERP as a tool for sustainable practices.

Thirdly, the project manager states that there are no consistent links found between financial and ESG indicators, including that the boundary between the two is still blurry. Connecting ESG data with internal customer data is a significant challenge related to construct validity with sustainability accounting and reporting. Therefore, ESG data management-oriented studies focusing on links between financial and ESG data should be explored, both from a data processing and system perspective. This could be done by interviewing data scientists or analysts working with similar projects as the ESG data task force initiative. Lastly, this case study focuses on a Norwegian bank operating in the Nordics, in which CSR is historically ingrained in business operations. Conducting a similar study in other parts of the world that is perceived to have less focus on CSR would be intriguing for cross-case analysis to compare differences and similarities in approaches. Additionally, regulatory pressure from EU/EEA is the most significant driver for Green IS adoption identified in this study, while financial institutions in other continents may not experience the same level of regulatory pressure.

9. Conclusion

This dissertation was driven by the following research question: *How do incumbent financial institutions overcome legacy systems to facilitate sustainability accounting and reporting?*

Through conducting an exploratory case study seeking to address the research question, this thesis addresses the call by vom Brocke et al. (2013) for more solution-oriented studies that outline how organisations can leverage the transformative power of IS to mitigate negative environmental impacts. Thus, the main contribution of this study is bridging the gap highlighted by vom Brocke et al. (2013) in academia. To our knowledge, this case study represents one of the few empirical studies into Green IS adoption to facilitate sustainability accounting and reporting. As such, this thesis provides new knowledge to this field of research by examining two underlying sub-questions covering drivers and

inhibitors of Green IS adoption as well as the facilitation of sustainability accounting and reporting from an IS perspective. While this study goes a long way in showcasing how financial institutions can adopt Green IS to facilitate sustainability accounting and reporting, it is not an exact blueprint for others. Other companies must evaluate and navigate their own drivers and inhibiting factors for Green IS adoption, which can have significant ramifications for the strategic IS choices they will have to make, as evidenced in this study. However, results from this study can serve as inspiration for how other financial institutions can overcome existing legacy systems by leveraging Green IS to build an ESG data hub to facilitate sustainability accounting and reporting, or similar green activities that require external ESG data.

Moreover, examining the first sub-question: *What are the drivers and inhibitors of Green IS adoption within the Norwegian banking industry?* Findings from this study indicate that regulatory pressure is the most fundamental driver of Green IS adoption, which in turn results in pressure from enhanced stakeholder ambitions and underlying economic incentives. Additionally, all participants stressed the need to replace manual processes with more structured and automated handling of ESG data. On the other hand, challenges related to data quality and lack of ESG data, in addition to inherent IT infrastructure limitations consisting of legacy systems are identified as inhibiting factors for adoption. Examining the second sub-question: *How does a Norwegian bank facilitate sustainability accounting and reporting from an IS perspective?* One of the most interesting findings in relation to the facilitation of sustainability accounting and reporting is the lack of sustainability considerations included in their ongoing ERP project. Therefore, it does not align with the concept of S-ERP from IS literature. Nevertheless, several of the participants acknowledge that they must integrate their ERP solution with ESG data at a later stage, when the implementation has progressed and issues surrounding ESG data are resolved. Due to the limiting characteristics of their current IT infrastructure, the Norwegian bank has established an ESG data task force that is tasked with building an ESG data hub outside of the financial value chain. Purposefully, the ESG data hub will operate as a centralized hub not only facilitating sustainability accounting and reporting, but also company-wide business needs requiring ESG data. Thus, their proposal for an ESG data hub architecture (fig. 8) provide valuable insights for other financial institutions that could opt to follow a similar Green IS approach; bypassing existing legacy systems to get started with green initiatives. If so, practitioners should also consider a similar PaaS solution as IPA, to utilize the flexibility and scalable capabilities in a fast-changing environment requiring ESG data for business needs.

To conclude, solution-oriented studies regarding Green IS are still scarce and in its infancy in academia. Therefore, scholars should focus some of their attention to explore similar research avenues within Green IS.

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Appendix A – NSD Approval

Vurdering

16.12.2021 ✕ Skriv ut

Referansenummer

807962

Prosjekttittel

Master project in digital business systems

Behandlingsansvarlig institusjon

Høyskolen Kristiania – Ernst G. Mortensens Stiftelse / School of Economics, Innovation, and Technology / institutt for teknologi

Prosjektperiode

15.12.2021 - 01.06.2022

[Meldeskjema](#)

Dato

16.12.2021

Type

Standard

Kommentar

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 16.12.2021, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

DEL PROSJEKTET MED PROSJEKTANSVARLIG

For studenter er det obligatorisk å dele prosjektet med prosjektansvarlig (veileder). Del ved å trykke på knappen «Del prosjekt» i menylinjen øverst i meldeskjemaet. Prosjektansvarlig bes akseptere invitasjonen innen en uke. Om invitasjonen utløper, må han/hun inviteres på nytt.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 01.06.2022.

LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake.

Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER

NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), og dataportabilitet (art. 20).

NSD vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

Microsoft er databehandler i prosjektet. NSD legger til grunn at behandlingen oppfyller kravene til bruk av databehandler, jf. art 28 og 29.

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:

<https://www.nsd.no/personverntjenester/fylle-ut-meldeskjema-for-personopplysninger/melde-endringer-i-meldeskjema>

Du må vente på svar fra NSD før endringen gjennomføres.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Appendix B – Interview guides

Introduksjon

Først og fremst takk for at du stiller tiden din til disposisjon for å la deg intervjuet for å bidra til vårt mastergradsprosjekt. I dette prosjektet tas det utgangspunkt i innføringen av den nye EU-taksonomien som vil sette strenge krav til bærekraftregnskap og rapportering for virksomheter innad i EU/EØS (European Union, 2021), og i den forbindelse ønsker vi å undersøke hvilken rolle Enterprise Resource Planning- (ERP)/informasjonssystemer (IS) spiller for norske virksomheter som skal tilfredsstille både sine egne og gitte regulatoriske bærekraftsmål.

Ved deltagelse i dette intervjuet er vi underlagt strenge regler i forhold til anonymitet, personvern og konfidensialitet. Derfor ønsker vi å presisere at din identitet samt arbeidsgiver vil forbli anonymisert og svarene vil kun tjenestegjøre formålet med å svare på prosjektets overordnede mål nevnt ovenfor. I tillegg har du når som helst lov til å trekke deg under intervjuet eller rett etter intervjuet. Dataen behandles konfidensielt hvorav kun personer tilknyttet prosjektet vil ha tilgang.

Ref. samtykkeskjemaet, samtykker du til at intervjuet tas opp og at dine svar transkriberes?

Dette intervjuet vil som nevnt i intervju-innkallingen være semi-strukturert. Semi-strukturert intervju legger til rette for en uformell prat hvor det gis rom for at du som intervjudeltager kan drøfte og ta opp relevante temaer og problemstillinger når det er ønskelig.

Intervjuguide – direktør som styrer mandatet for ERP-prosjektet

1. Grunnleggende spørsmål:

- 1.1. Kan du fortelle litt om bakgrunnen din?
- 1.2. Hvor lenge har du jobbet i selskapet?
- 1.3. Hva er din stilling i selskapet?
- 1.4. Jobber du nå med bærekraft relatert til din posisjon i selskapet?
 - 1.4.1. Hvis ja, hvilken erfaring har du med å jobbe med bærekraft?

2. Selskapets overordnede motivasjon når det kommer til bærekraft

- 2.1. Med bakgrunn i selskapets nye bærekraftstrategi som er blitt lansert, hva er formålet med denne strategien?
 - 2.1.1. I hvilken grad føler du strategien understøtter arbeidet deres med bærekraftregnskap og rapportering?
 - 2.1.2. Hvilke muligheter og utfordringer føler du virksomheten din står overfor relatert til bærekraft?

2.2. I lys av EU-taksonomien som er på trappene, hvilke ambisjoner har dere til bærekraftregnskap og rapportering og hvordan er de på linje med taksonomien?

3. Driverne bak økt fokus på bærekraftregnskap og rapportering

3.1. Hvilke muligheter og utfordringer ser du for deg at bærekraftregnskap og rapportering kommer til ha for din virksomhet i årene som kommer?

3.2. Hvilke vurderinger og hensyn ble tatt da dere besluttet å adoptere og implementere et helhetlig ERP-system (Oracle) på tvers av konsernfinans?

3.2.1. Har det i tillegg vært noen barrierer for hvorfor dette ikke har blitt iverksatt tidligere?

4. Kartlegge støtte for bærekraftregnskap og rapportering sett i lys av ERP-implementeringsprosjektet

4.1. I lys av EU-taksonomien, hvor godt posisjonert tror du det nye ERP-systemet vil være for å imøtekomme kravene til bærekraftregnskap og rapportering?

4.1.1. Og til hvilken grad?

4.2. Har dere kartlagt forbedringsområder og flaskehalsar med deres eksisterende informasjonssystem(er) for bærekraftregnskap og rapportering som er kritisk for prosjektets suksess?

4.2.2. Hvis så, er det noe som spesielt utpeker seg som mangelfullt eller utfordrende?

4.3. Hva er de mest åpenbare gevinstene og fallgruvene i forbindelse med nytt ERP-system som dere ser for dere?

4.3.2. Er det da noen spesifikke prosessgevinster dere ser for dere?

5. Avslutning

5.1 Til slutt, er det noe vi ikke har diskutert som du føler er relevant eller viktig for det vi har snakket om?

5.2. Ettersom intervjuet ikke kan spores tilbake til deg på grunn av anonymitet (iht. personvern), er du derfor innforstått med at du ikke har muligheten til å trekke din deltagelse etter dette intervjuet er avsluttet?

Intervjuguide - prosjektleder i forbindelse med bærekraftregnskap og rapportering

1. Grunnleggende spørsmål:

- 1.1. Kan du fortelle litt om bakgrunnen din?
- 1.2. Hvor lenge har du jobbet i selskapet?
- 1.3. Hva er din stilling i selskapet?
- 1.4. Jobber du nå med bærekraft relatert til din posisjon i selskapet?
 - 1.4.1. Hvis ja, hvilken erfaring har du med å jobbe med bærekraft?

2. Selskapets overordnede motivasjon når det kommer til bærekraft

- 2.1. Med bakgrunn i selskapets nye bærekraftstrategi som er blitt lansert, hva er formålet med denne strategien?
 - 2.1.1. Hvordan vil mandatet og prosjektet deres støtte opp under den nye bærekraftstrategien og arbeidet tilknyttet bærekraftregnskap og rapportering?

3. Driverne bak økt fokus på bærekraftregnskap og rapportering

- 3.1. Hvilke muligheter og utfordringer ser du for deg at bærekraftregnskap og rapportering kommer til ha for ditt selskap i årene som kommer?
- 3.2. I lys av EU-taksonomien som er på trappene, hvilke ambisjoner har dere til bærekraftregnskap og rapportering og hvordan er de på linje med taksonomien?

4. Kartlegge støtte for bærekraftregnskap og rapportering sett i lys av ERP-implementeringsprosjektet

- 4.1. Har dere kartlagt forbedringsområder og/eller flaskehalsen med deres eksisterende informasjonsflyt og informasjonssystem(er) for bærekraftregnskap og rapportering som er kritisk for prosjektets suksess?
 - 4.1.1. Hvis så, er det noe som spesielt utpeker seg som mangelfullt eller utfordrende når det kommer til funksjonalitet og/eller bærekraftdata?
- 4.2. Hva vil du si er de største gevinstene og fallgruvene i forbindelse med prosjektet?
 - 4.2.1. Hvorfor?
- 4.3. I lys av EU-taksonomien, hvor viktig vil gjennomførelsen av deres prosjekt være for å imøtekomme kravene for bærekraftregnskap og rapportering?

1. Grunnleggende spørsmål:

- 1.1. Kan du fortelle litt om bakgrunnen din?
- 1.2. Hva er din stilling i selskapet?
- 1.3. Hvor lenge har du jobbet i selskapet?
- 1.4. Jobber du nå med bærekraft relatert til din posisjon i selskapet?
 - 1.4.1. Hvis ja, kan du beskrive en typisk dag du jobber med bærekraftrelaterte oppgaver?
- 1.5. Er du kjent med EU-taksonomien? *

2. Driverne bak økt fokus på bærekraftregnskap og rapportering

- 2.1. Hvilke muligheter og utfordringer ser du for deg at bærekraftregnskap og rapportering kommer til ha for din virksomhet i årene som kommer?
- 2.2. Er du kjent med at selskapet ditt har besluttet å implementere et nytt ERP-system (Oracle) på tvers av konsernfinans?
 - 2.2.1. Hvis ja, hva tror du er hoveddriverne bak denne avgjørelsen sett fra ditt ståsted nedenfra og opp i organisasjonen?

3. Kartlegge støtte for bærekraftregnskap og rapportering sett i lys av ERP-implementeringsprosjektet

- 3.1. Bruker du ett eller flere ERP-/informasjonssystemer for bærekraftregnskap og rapportering?
- 3.2. Hvor fornøyd er du med hvordan nåværende ERP-/informasjonssystem(er) støtter ditt arbeid med bærekraftregnskap og rapportering?
 - 3.2.1. Hvorfor?
- 3.3. Mer spesifikt, er det noe som utpeker seg som mangelfullt i form av funksjonalitet eller er utfordrende med dagens informasjonssystem eller informasjonsflyt med tanke på bærekraftregnskap og rapportering?
 - 3.3.1. Hvis ja, hva?
- 3.4. For å forbedre og videreutvikle bærekraftregnskapet og rapporteringen (i lys av kommende krav fra EU-taksonomien*) i deres virksomhet, er det noe du vil peke på gjennom dine egne erfaringer som er kritisk for suksessen til implementasjonen av det nye ERP-/Oracle-systemet?
 - 3.4.1. Er det da noen spesifikke prosessgevinster som er viktig å realisere og systemmessige elementer som er viktig å utbedre?

Appendix C – Screenshots from coding in MAXQDA

Document System

Participant F - transkribert	34
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Bygge ESG Data Hub	9
Sentralisert hub	5
IPA-systemet	4
Skalerbare kapabiliteter	7
Automation and streamlining	3
PowerBI dashboard	3
Construct validity	6
Datainnsamling	4
Data-driven	1