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Financial Stakeholder Perceptions of Green IS

Risks, Rewards and Realities

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Financial Stakeholder Perceptions of Green IS: Risks, Rewards, and Realities

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ABSTRACT (MAX. 200 WORDS):

As environmental pressures mount, the corporate world is steering towards green information systems (IS) to respond to sustainability predicaments. This study uncovers financial stakeholders' attitudes towards the benefits and challenges of environmental and carbon management systems (ECMS) initiatives, as well as transformative green IS initiatives. Relying on the usefulness of signalling theory and comprehensive semi-structured interviews, the findings of our analysis highlight a pressing need for consistent and verifiable environmental sustainability data to inform financial stakeholders' decision-making. While green IS initiatives present a promising outlook for environmental benefits, they simultaneously expose significant risks and data management challenges. Additionally, an emergent discrepancy appeared between stakeholders' overt dedication to sustainability and their tangible investment actions, revealing the intricate mechanics of investment decision-making processes. Importantly, the study underscores the profound impact of regulatory mandates in sculpting the evolution of corporate sustainability reporting. Such insights offer critical directions for businesses aspiring to harmonize their green IS ventures with the anticipations of financial stakeholders, fostering a shift towards increasingly sustainable investment protocols.

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1 Introduction

1.1 Background

Increasing pressure from legislators, stakeholders and an upward trend in the frequency of climate change-related extreme weather events have made environmental sustainability one of the greatest societal challenges of contemporary society (Campbell, 2007; IPCC, 2022). Organisations addressing this grand challenge will have to grapple with balancing profits and climate change mitigation and adaptation activities simultaneously. However, with green information systems (green IS), environmental sustainability and profits are not necessarily at odds. Green IS initiatives have the potential to facilitate sustainable practices on a commercial scale while generating business value at the same time (Hanelt, Busse & Kolbe, 2017). Additionally, green IS initiatives, which Wang, Brooks and Sarker (2015) define as the holistic process from initiation to realizing the outcomes of the implementation, can contribute to a proactive, ambitious sustainability strategy that anticipates future consumer opinion and maintains legitimacy in the long run (Wagner & Schaltegger, 2010).

The green IS implemented in such initiatives are essentially digital innovations that configure digital and physical elements in a novel way, but they also allow new ways of addressing environmental sustainability while satisfying business value requirements at the same time (Chen, Boudreau & Watson, 2008; Harmon & Moolenkamp, 2012; Yoo, Henfridsson & Lyytinen, 2010). For example, environmental and carbon management systems (ECMS) can informate the organisation with environmental reporting and enable resource efficiency, cost savings, and eco-brand value (Chen, Boudreau & Watson, 2008; Nishant, Teo & Goh, 2017). Eco-brand value, in particular, increases the visibility of environmental performance, thus placing institutional pressure on other firms within the same industry to adopt equally or more sustainable practices (Chen, Boudreau & Watson, 2008). Additionally, green IS initiatives can also foster eco-effectiveness, which goes beyond damage reduction and generates a positive environmental impact (Jenkin, Webster & McShane, 2011). In short, green IS initiatives can facilitate the complementarity between environmental sustainability and business value.

In contrast, the relationship between sustainability and business value remains as a trade-off in some cases, meaning that they are not mutually contributory (Nishant, Teo & Goh, 2017). This situation is different from what classic, non-green IS initiatives usually face, since these only address economic sustainability, which makes them simpler than green IS initiatives. Green IS initiatives add a sustainability dimension, leading to increased tensions and complexity that need to be managed (Chan & Ma, 2017; Chou, 2013; Park, Pavlou & Saraf, 2020; Teubner & Stockinger, 2020). In other words, the link between green IS initiatives and business value remains unclear, and it is muddled by a plethora of risks.

1.2 Research Problem

The research problem is scoped around the factors that shape financial stakeholders' perceptions of green IS initiatives, more specifically those regarding benefits and risks. To clarify, a financial stakeholder is defined as anyone with a financial interest in organisational initiatives, which for instance could be green IS initiatives, which we will delve into in this study. However, our empirical focus will be on investors, financial advisors, and senior IT managers who all have a financial stake in green IS initiatives. In terms of risk, the research problem draws upon Nishant, Teo and Goh's (2017) call for studies examining the risks of green information systems (IS) initiatives from a financial perspective. Since the publication of their article, there is, to the best of our knowledge, no publication within the scope of the reviewed literature that explicitly addresses this topic. However, Nishant, Teo and Goh's (2017) exclusive focus on risk perceptions only relates to the critical perspective towards green IS initiatives, which is balanced with a more holistic approach that includes perceived rewards and benefits. Additionally, organisational green IS initiatives are contingent on financial stakeholder attitudes (Hu et al., 2016). Thus, it is relevant to investigate financial stakeholder perspectives and how they are constructed concerning the risks and benefits of green IS initiatives.

From a financial perspective, it is important to explore how perceived benefits and risks can influence a financial stakeholder's opinion on green IS initiatives, as they can have a significant influence on the direction of such undertakings (Hu et al., 2016).

The role of risks and benefits in shaping financial stakeholder attitudes towards green IS initiatives further relates to the previously mentioned tensions of corporate social responsibility, since it refers to the complexities and tensions between the dimension of operating environmentally sustainably and striving for profits (Bai & Sarkis, 2013; Werther Jr & Chandler, 2010). Despite these tensions, risks, and complexities, IS-enabled environmental performance has also been shown to have a positive impact on firm performance and eco-brand reputation (Sedera et al., 2017; Yoo & Lee, 2018).

While green IS initiatives may have the potential to yield long-term financial benefits and increase environmental performance, they are also accompanied by uncertainties and costs (Przychodzen, Gómez-Bezares & Przychodzen, 2018). Financial stakeholders may be more inclined to support green IS if they perceive it as a low-risk investment, or if they believe that the business value of such initiatives is clear (Chan & Ma, 2017; Przychodzen, Gómez-Bezares & Przychodzen, 2018).

In conclusion, the existing literature on the financial aspects of IS and sustainability has largely focused on business value (Sedera et al., 2017), complexity (Bai & Sarkis, 2013; Sarkis, Koo & Watson, 2013), risk (Nishant, Teo & Goh, 2017), and environmental performance (Hertel & Wiesent, 2013; Hu et al., 2016).

1.3 Research Question

In relation to the research problem regarding perceived risks and rewards of green IS initiatives, the research question investigates the factors behind these perceptions, and thus, the research question thus becomes: *how do financial stakeholders perceive the risks and benefits of green IS initiatives?*

The perception of benefits regarding green IS initiatives are relevant in terms of lower operational costs, improved efficiency, and reduced risk of regulatory fines and penalties, which in turn enhances their financial performance (Melville, 2010; Busch & Lewandowski, 2018). By adopting green IS, companies can also gain a competitive advantage over their rivals by enhancing their reputation, meeting consumer demands for environmentally responsible products, and fostering innovation (Seidel, Recker & vom Brocke, 2013).

However, the research question also emphasizes the risks that financial stakeholders encounter concerning green IS initiatives, which can significantly influence the course of such initiatives (Hu et al., 2016).

Financial stakeholders are increasingly becoming aware of the importance of environmental, social, and governance (ESG) factors in their investment decisions and are seeking companies with a strong commitment to sustainability and responsible business practices (Eccles & Serafeim, 2013). By embracing green IS, firms can demonstrate their commitment to sustainability, minimize potential risks associated with environmental and social issues, and attract environmentally conscious financing (Watson, Boudreau & Chen, 2010).

In summary, the decision to finance green IS initiatives is a strategic matter that can significantly impact a firm's profitability and competitiveness, which points towards the aim of the study, which will be discussed in the following section (Melville, 2010; Seidel, Recker & vom Brocke, 2013).

1.4 Purpose

This study aims to understand the main risk factors and benefits that shape the financial stakeholder perception of green IS initiatives to create valuable insights for organisations that can contribute to a greener future by aligning their green IS initiatives with financial stakeholder perceptions (Seidel, Recker & vom Brocke, 2013).

1.5 Delimitation

This study is tailored to uncover the perception of financial stakeholders from the Nordic countries towards green IS initiatives. The targeted stakeholders consist of three major groups: investors, financial advisors, and one senior IT professional, all having a pivotal role in shaping the financial perspective towards green IS initiatives.

The investors' point of view is crucial as their investment decisions often reflect the acceptance or rejection of green IS initiatives. Their perspectives will shed light on how they weigh the financial risks and benefits associated with these initiatives.

Financial advisors, on the other hand, bridge the gap between complex green IS initiatives and investors by interpreting and advising on the initiatives. Understanding their perceptions helps to glean how they assess the credibility of these initiatives and influence the decision-making process.

Lastly, the senior IT professional's viewpoint will offer insights into how organisations articulate the value of green IS initiatives in terms of financial returns and sustainable growth from an IT perspective. Their insights will help uncover the strategies used to balance the pursuit of sustainability goals with financial performance.

However, this research does not consider perspectives from non-financial stakeholders, such as customers or employees, who may also impact the adoption of green IS initiatives.

2 Theoretical Background

This theoretical section will conceptualize and categorize green IS initiatives. Subsequently, the section will address the associated benefits, risks, and prerequisites to investigate how they differ between different categories of green IS initiatives and create a nuanced understanding of the financial stakeholder's perception.

2.1 Green IS Initiatives

Green IS have become increasingly important as IS research has shifted from viewing information technology as part of the problem to viewing it as a part of the solution to decreasing the negative environmental impact of business operations (Wang, Brooks & Sarker, 2015). This perception is reflected in green IS initiatives that design, implement, and manage information systems which contribute to sustainable business practices and environmental sustainability objectives (Hertel & Wiesent, 2013; Watson et al., 2011). The primary aim of these initiatives is to facilitate eco-efficiency, i.e., the efficient use of resources and reducing negative environmental impact, eco-equity, i.e., product stewardship, and eco-effectiveness, i.e., going beyond reducing damage and generating a positive environmental impact within organisations (Jenkin, Webster & McShane, 2011). However, the challenges involved are numerous, including both managerial and technological issues, while benefits are multidimensional and non-financial (Ågerfalk, Axelsson & Bergquist, 2022; Benaroch, Lichtenstein & Robinson, 2006; Bengtsson & Ågerfalk, 2011). These challenges and benefits will differ depending on the type of initiative, which will be introduced in the following section.

2.2 Categories of Green IS Initiatives

While the broad definition of green IS initiatives was introduced in the previous section, this section will provide a comprehensive understanding of the dimensions of green IS initiatives. These dimensions will be used to conceptualize different classes of green IS initiatives.

Green IS initiatives often relate to sustainability transformations, which are multi-layered, complex phenomena (Melville, 2010). In addition to this, several extant studies offer different categorizations of green IS initiatives that often are of a fuzzy and non-discrete nature (Carrillo-Hermosilla, del Río & Könnölä, 2010; Dehning, Richardson & Zmud, 2003; Hanelt, Busse & Kolbe, 2017; Jenkin, Webster & McShane, 2011). In this regard, a morphological analysis lends itself well to making sense of such complex initiatives and creating a coherent synthesis in the form of a categorization (Markus & Mentzer, 2014). This is done by finding plausible combinations across dimensions while eliminating implausible combinations to reduce complexity (Markus & Mentzer, 2014).

Accordingly, green IS initiatives will be categorized according to their different dimensions, and the first one relates to their types of environmental impact, i.e., eco-efficiency, eco-equity, and eco-effectiveness. The second dimension is the type of green IS strategy that lay behind it, ranging from low impact to transformative, or types 0-3, respectively. The third dimension is the type of eco-innovation brought about by green IS initiatives, ranging from non-specific, “end-of-pipe” initiatives to those with a systemic change impact (Carrillo-Hermosilla, del R o & K nn l , 2010). Finally, the fourth dimension is the strategic role of IS, which Dehning, Richardson and Zmud (2003) divide into the ability of IS to automate, informate or transform business practices.

Now, the different dimensions will be addressed in greater detail in the remaining part of this section which finally contribute to a categorization based on these dimensions.

The first dimension, i.e., the type of environmental impact, is described by Hanelt, Busse, and Kolbe (2017) alongside Jenkin, Webster and McShane (2011) as three types of practices enabled by green IS brought about by green IS initiatives:

- Eco-efficiency refers to eco-innovations that enhance the efficiency of business processes in which they are deployed (Hanelt, Busse & Kolbe, 2017).
- Eco-equity relates to the equitable balancing of the current and future needs of society and the organisation with regard to natural resources (Chen, Boudreau & Watson, 2008; Jenkin, Webster & McShane, 2011). This can be achieved through acknowledging and addressing the environmental impact of products from a lifecycle perspective, also termed product stewardship which can be assisted by green IS (Jenkin, Webster & McShane, 2011).
- Eco-effectiveness entails eco-innovations that enable new functionalities, processes, and business models that help achieve organisational sustainability goals.

The second dimension is described by Jenkin, Webster and McShane (2011) and pertains to four types of strategies for green IS initiatives which range from type 0 to type 3, which will be described in the following list:

- Type 0 refers to initiatives that increase visibility about their environmental sustainability ambitions without a proportionally positive environmental impact.
- Type 1 relates to eco-efficiency.
- Type 2 relates to eco-equity by reducing the negative environmental externalities of products.
- Type 3 strategies relate to eco-effectiveness with broad environmental sustainability considerations in the entire firm.

The third dimension is addressed by Carrillo-Hermosilla, del R o and K nn l , (2010) classified eco-innovations into three types, that can be implemented with green IS initiatives based on their impacts on economic and environmental sustainability: process eco-innovations, product eco-innovations, and systemic eco-innovations.

- Process eco-innovations focus on enhancing the environmental performance of business processes (Carrillo-Hermosilla, del Río & Könnölä, 2010).
- Product eco-innovations improve the environmental performance of products, leading to the development of new products that use fewer resources or consume less energy (Carrillo-Hermosilla, del Río & Könnölä, 2010).
- Systemic eco-innovations address the environmental performance of the systems of an organisation as a whole with a transformative approach. The eco-innovations mentioned above are not necessarily IS innovations, but even for non-IS innovations, supporting IS can contribute to eco-effectiveness and eco-efficiency (Hanelt, Busse & Kolbe, 2017).

These different types of eco-innovations are also related to the strategic roles of IS initiatives, which make up the third dimension. This fourth dimension divides the strategic roles of IS initiatives into three subcategories (Dehning, Richardson & Zmud, 2003).

- The first refers to automating business processes (Dehning, Richardson & Zmud, 2003).
- The second to informing them by collecting, disseminating, presenting, and visualizing information (Dehning, Richardson & Zmud, 2003).
- The third type describes how green IS initiatives can transform business models and processes by radically reshaping business processes and business models (Dehning, Richardson & Zmud, 2003).

Now that all the different dimensions have been described, a synthesizing framework is introduced below to categorize the identified types of green IS initiatives. This will help differentiate them in the rest of the thesis. However, type 0 initiatives have been omitted as they do not result in improved environmental performance (Jenkin, Webster & McShane, 2011).

Table 1. Categories of green IS initiatives.

Author	Type 1 initiatives	Type 2 initiatives	Type 3 initiatives
Jenkin, Webster & McShane (2011)	Type 1, eco-efficiency	Type 2, eco-equity	Type 3, eco-effectiveness
Carrillo- Hermosilla, del Río and Könnölä (2010)	Process eco-innovation	Product eco-innovation	Systemic eco-innovation
Dehning, Richardson and Zmud (2003)	Automate and informate	Informate	Transform and informate

The types identified are intended to describe ideal types that are not necessarily mutually exclusive, but for the sake of simplicity, they are divided into the three categories above in table 1.

In summary, the categorization establishes a foundation for differentiating green IS initiatives based on their categories, which helps the subsequent sections regarding benefits, risks, and prerequisites.

Moving forward, the subsequent section delves into the specific benefits of green IS initiatives, focusing on two essential dimensions: environmental and organisational performance.

2.3 Organisational and Environmental Benefits of Green IS

This section will address the commonly identified benefits for each type of green IS initiative in two dimensions, namely environmental and organisational performance. The section is structured according to the categorization of green IS initiatives made above with some general benefits that do not pertain to a particular type of initiative.

2.3.1 *Type 1 Initiatives and Eco-Efficiency*

The first category refers to eco-efficiency which enables organisations to decrease resource and energy consumption, waste generation, and greenhouse gas emissions resulting in cost savings, and a reduced environmental footprint (Carrillo-Hermosilla, del Río & Könnölä, 2010; Hanelt, Busse & Kolbe, 2017). This type of initiative can complement the production of environmentally sustainable products by decreasing the costs of production of end-of-pipe technologies that are added to a product to decrease its environmental impact (Carrillo-Hermosilla, del Río & Könnölä, 2010; Hanelt, Busse & Kolbe, 2017). These eco-innovations aim to optimize operations to increase the output produced without increasing its environmental impact, thereby contributing to the overall sustainability of the organisation (Carrillo-Hermosilla, del Río & Könnölä, 2010).

2.3.2 *Type 2 Initiatives and Eco-Equity*

The second type of initiative emphasizes designing and manufacturing environmentally friendly products that minimize resource consumption and waste generation throughout their lifecycle (Carrillo-Hermosilla, del Río & Könnölä, 2010). IS are useful in this regard because they can informate production and product design, by collecting and storing environmental data throughout the life cycle (Dehning, Richardson & Zmud, 2003; Jenkin, Webster & McShane, 2011). Although such eco-innovations are not necessarily digital, supporting IS can significantly enhance the contribution of green non-IS innovation to the organisational performance by improving both eco-efficiency and eco-effectiveness (Hanelt, Busse & Kolbe, 2017). Initiatives implementing IS to support such eco-innovations enable digital eco-innovation which helps reduce the costs of sustainable production, improves the environmental performance of products, and can generate a positive environmental impact, i.e., eco-effectiveness (Hanelt, Busse & Kolbe, 2017). Additionally, these supporting IS also afford business process performance through technological flexibility, which is the separation of business processes and the specific technologies used with the help of an intermediary digital layer

(Hanelt, Busse & Kolbe, 2017). Finally, environmentally superior products can also contribute to the eco-brand value of organisations and differentiate them from competitors (Molla, 2013). Briefly stated, type 2 initiatives involve green IS that informate production, allow technological flexibility and facilitate digital eco-innovation, contributing to both organisational and environmental performance (Hanelt, Busse & Kolbe, 2017; Jenkin, Webster & McShane, 2011).

2.3.3 *Type 3 Initiatives and Eco-Effectiveness*

The last type of green IS initiatives empowers organisations in environmental sustainability transformations by enabling innovative, sustainable business models, products, and services, and fostering a culture of sustainability (Hanelt, Busse & Kolbe, 2017). Additionally, the innovative nature of this type of initiative also contributes to green innovation capabilities (Dao, Langella & Carbo, 2011; Loeser et al., 2017). An example of such an initiative is one that implements a sharing economy IS applied to increase fixed asset utilization, generating a positive environmental impact through leveraging an innovative business model (Hanelt, Busse & Kolbe, 2017; Malhotra, Melville & Watson, 2013).

In addition, a company might implement an environmental and carbon management system, or an ECMS, that enables them to track and reduce their environmental impact systematically. These eco-innovations encompass strategies, policies, and practices aimed at fostering a sustainable organisational culture and achieving sustainability goals (Carrillo-Hermosilla, del Río & Könnölä, 2010). For example, an ECMS can contribute to an organisational goal of complying with environmental standards and regulations with accurate and verifiable environmental data and low-effort, automatic carbon footprint calculations (Chen, Boudreau & Watson, 2008; Corbett, 2013). For such a system to be impactful in sustainability transformations, however, there is both a need for collecting environmental data as mentioned and an approach for disseminating them throughout the organisation in a structured, standardized way (Seidel et al., 2014; Seidel, Recker & Vom Brocke, 2013).

According to Seidel, Recker and vom Brocke (2013), this can contribute to other green IS initiatives that focus on output management, which is an IS affordance that allows shaping working practices to stay below a defined level of negative environmental impact. This affordance, however, requires monitoring of negative environmental impact, e.g., greenhouse gas emissions from an ECMS, and a set limit of negative environmental impact that is allowed (Seidel, Recker & Vom Brocke, 2013). While this relates more to a type 1-initiative that strives towards damage reduction than transformative initiatives, it requires a foundation of environmental data (Seidel, Recker & Vom Brocke, 2013).

2.3.4 *General Benefits*

Additional benefits that do not necessarily relate to a specific type of green IS initiatives refer to institutional factors such as improved compliance with environmental sustainability regulations, facing stakeholder and industry pressure, and eco-brand value (Gray, No & Miller, 2014; Molla, 2013). Additionally, the successful execution of green IS initiatives contributes to an improved absorptive capacity to learn, assimilate and use knowledge for future green IS initiatives and contribute to green IS capital (Cooper & Molla, 2017).

Green IS initiatives that aim at informing business practices additionally enable organisational sustainability sensemaking, and if launched initiatives succeed, they can furthermore prompt a self-reinforcing strategic change process that increases the environmental orientation of the organisation (Bengtsson & Ågerfalk, 2011; Hedman & Henningsson, 2016; Jenkin, Webster & McShane, 2011).

2.3.5 Summary

The following table summarizes the benefits identified above for each type of green IS initiative in two dimensions, environmental performance and organisational performance.

Table 2. Green IS drivers divided by the type of green IS initiative.

Type of green IS initiative	Environmental performance benefits	Organisational performance benefits	Sources
Type 1	Waste minimization in production, fewer resources consumed per unit of output in production, and eco-efficiency	Operational efficiency, cost savings, contribution to environmental sustainability goals	Carrillo-Hermosilla, del Río & Könnölä, 2010; Hanelt, Busse & Kolbe, 2017
Type 2	Reduced resource consumption of products, waste minimization across the entire product life cycle, product stewardship	Contribution to environmental sustainability goals, eco-brand value, technological flexibility, digital eco-innovation practices	Carrillo-Hermosilla, del Río & Könnölä, 2010; Jenkin, Webster & McShane, 2011; Molla, 2013
Type 3	Positive environmental impact, sustainability transformation in business, eco-effectiveness	Green innovation capabilities, innovative processes and business models, verifiable compliance with standards and regulations, eco-effectiveness	Hanelt, Busse & Kolbe, 2017; Malhotra, Melville & Watson, 2013; Chen, Boudreau & Watson, 2008; Corbett, 2013; Seidel et al., 2014; Seidel, Recker & Vom Brocke, 2013

The distinctions made between green IS initiative classes, and their benefits and risks are an important nuance since Wang, Brooks and Sarker (2015) find that a large number of green IS studies do not differentiate between different types of initiatives. However, to accurately conceptualize these initiatives, Akhlaghpour, Wu, Lapointe and Pinsonneault (2013) recommend that the IT artefact ought to be explicitly described, which is why the following section is devoted to the technologies used in different types of green IS initiatives.

2.4 The Technological Factors in Green IS Initiatives

The focus of this section is to provide examples of technologies used in each type of green IS initiative and relevant technological factors, such as data consolidation practices, sensemaking affordances, etc. These can shed light on the technological implications of these green IS initiatives and how these implications affect risks and benefits.

The first class of technologies are those which enable operational efficiency improvements by automating and informing business processes, while the second relates to green IS with informational and sensemaking capabilities that collect, disseminate, and visualize environmental information, while the third type of technologies constitutes novel products, services or business models.

The first type of technologies aimed at operational efficiency achieve this primarily through informing operations or by automating processes to decrease the costs of otherwise more costly sustainable production (Carrillo-Hermosilla, del Río & Könnölä, 2010; Hanelt, Busse & Kolbe, 2017; Jenkin, Webster & McShane, 2011; Kurkalova & Carter, 2017). An example of a technology used for such eco-efficiency initiatives is described by Hanelt, Busse and Kolbe (2017), which is a load-checking system for electric vehicles used by a mail and parcel delivery service.

The second type of technology is aimed at informing operations with decision support system functionality for management and employees that visualize the environmental impact of business operations. This can be helpful for product stewardship by identifying how a product generates greenhouse gas emissions throughout its lifecycle, and the emissions per business area, function and process enabling greenhouse gas emissions initiatives in the short run and the long term (Jenkin, Webster & McShane, 2011; Nishant, Teo & Goh, 2017; Seidel et al., 2014). Furthermore, these informational affordances can contribute to environmental sustainability sensemaking in organisations, increasing the awareness of environmental sustainability and prompting change toward environmentally sustainable practices (Bengtsson & Ågerfalk, 2011; Seidel et al., 2018). As a consequence, these affordances require organisations to collect and consolidate extensive amounts of environmental data and perform complex calculations of their carbon footprints for environmental carbon management systems (ECMS), which are often outsourced to the system provider (Ågerfalk, Axelsson & Bergquist, 2022; Corbett, 2013; Zampou et al., 2022).

The third and final class of technologies are those aimed at business transformations that introduce novel products, services or business models (Hanelt, Busse & Kolbe, 2017; Nishant, Teo & Goh, 2017). This transformative class of technologies is arguably also the most radically innovative of the three as it entails a fundamental redefinition of business practices, implying both significant risks and a large potential payoff (Dehning, Richardson & Zmud, 2003; Hanelt, Busse & Kolbe, 2017).

The technological aspects addressed above help conceptualize green IS initiatives and contribute to a nuanced conceptualization of their risks, which will be described in greater detail in the following section.

2.5 Risks

It has been established that green IS initiatives can contribute to improved organisational and environmental performance by implementing systems that facilitate compliance, eco-efficiency, -equity, and -effectiveness. Despite these benefits, there are still drawbacks and risks that are relevant for green IS initiatives, which this section will discuss based on the option-based risk management (OBRiM) framework for IS initiatives.

Although this framework is applicable for IS initiatives in general, there is no application of this framework for green IS initiatives to the best of our knowledge. In other words, this approach will enable the study to make a thoughtful inventory of risks and contribute with a revised version for green IS initiatives. According to Benaroch, Lichtenstein and Robinson (2006), risks for such initiatives can be divided into categories that are addressed below in the following subsections.

2.5.1 *The Change Impact of Green IS Initiatives*

Firstly, green IS initiatives are characterized by their change impact, which can become a significant risk factor, since green IS initiatives introduce new complexity into the operations of firms and prompt change on the individual and organisational level (Benaroch, Lichtenstein & Robinson, 2006; Bengtsson & Ågerfalk, 2011; Chan & Ma, 2017; Chou, 2013). This is especially true for transformative green IS initiatives, i.e. type 3 initiatives as mentioned in table 1, which entail large-scale, systemic changes in processes and/or service offerings (Hanelt, Busse & Kolbe, 2017; Park, Pavlou & Saraf, 2020). For instance, an initiative aiming to implement a green IS that enables environmental reporting is likely to face resistance in the form of incompatible organisational processes and structures that need to be redesigned extensively (Bengtsson & Ågerfalk, 2011).

2.5.2 *Architectural Stability Issues, Technological Novelty and Complexity of Green IS Initiatives*

The change impact of green IS initiatives is not only organisational, but also technological since initiatives implementing such radically innovative green IS can be seen as an example of leveraging digital technology to create business value, or digital innovation for short (Hund et al., 2021). Innovative initiatives such as these, termed exploration by Park, Pavlou and Saraf (2020) are balanced with “exploitation” which is the optimization of existing business processes. In other words, both constitute a paradox that has innovation and flexible architectures at the one end while the stability and integrity of existing IT architecture are at the opposing end (Benaroch, Lichtenstein & Robinson, 2006; Park, Pavlou & Saraf, 2020; Teubner & Stockhinger, 2020). To address this paradox, Park, Pavlou and Saraf (2020) propose ambidexterity to balance the stability and integrity of IT infrastructure against innovation and flexible architectures, which characterize innovative green IS initiatives.

By this logic, ambidextrous companies have constrained resources available for exploration activities, including innovative green IS initiatives, after spending resources on exploitation activity (Park, Pavlou & Saraf, 2020; Teubner & Stockhinger, 2020).

In short, green IS initiatives can challenge the stability and integrity of existing IT infrastructure, introduce new operational and technological risks, and increase the complexity of organisational processes (Chan & Ma, 2017; Chou, 2013; Park, Pavlou & Saraf, 2020; Teubner & Stockhinger, 2020). Additionally, the pool of organisational resources for exploration is limited, and it becomes more crowded with green IS initiatives (Chou, 2013; Park, Pavlou & Saraf, 2020; Teubner & Stockhinger, 2020).

Another technological risk factor is the novelty of the technology, which is an additional risk factor for type 3 initiatives which leverage technologies in a radically innovative way. Furthermore, the size and complexity of type 3 and type 2 initiatives are often more pronounced than for type 1 initiatives, which are less organisationally specific and more contained.

2.5.3 Performance, Clarity of Benefits, and Scope

Furthermore, the economic value of green IS initiatives is often intangible, unclear, prone to risk, and the return on investment usually accrues in the long run (Bai & Sarkis, 2013; Chan & Ma, 2017; Chou, 2013; Przychodzen, Gómez-Bezares & Przychodzen, 2018). Additionally, green IS initiatives introduce change to business practices which is often emergent and multi-dimensional, making it more difficult to predict the change and accurately scope the initiative (Benaroch, Lichtenstein & Robinson, 2006; Bengtsson & Ågerfalk, 2011). The difficulties in assessing the benefits and scope of green IS initiatives can lead to increased difficulty in strategically justifying the project (Bai & Sarkis, 2013). The challenges of strategic justification and anticipating a clear business outcome and scope make it all the more relevant to address the subsequent risks of organisational support in the following section.

2.5.4 Organisational Support and Skill

This subsection focuses on the risk factors of organisational support in terms of management commitment and the relevant skills contained within the implementing organisation.

With regard to organisational support, an initiative lacking managerial commitment runs the risk of being hampered by incompatible business goals and values (Benaroch, Lichtenstein & Robinson, 2006; Hedman & Henningsson, 2016). However, Thomas, Costa and Oliveira (2016) argue that empirically, managerial commitment does not have a significant influence as a risk factor, which brings the importance of this type of risk into question.

This fact also relates to the fact that many green IS initiatives materialize through bottom-up processes with environmentally concerned employees acknowledging problems and suggesting solutions in terms of environmental performance (Hedman & Henningsson, 2016). Nevertheless, the impact of such bottom-up processes is contingent upon their compatibility with existing business goals and values, which means that managerial commitment still is relevant (Hedman & Henningsson, 2016).

Furthermore, green IS initiatives do not only depend on how well they correspond with values and goals but also how feasible they are in terms of the green IS skill and green IS capital contained within the organisation (Benaroch, Lichtenstein & Robinson, 2006; Cooper & Molla, 2017). Although these concepts are relevant, their significance is debatable since Nishant, Teo and Goh (2017) did not find a difference between financial stakeholder reactions toward innovative and non-innovative firms announcing green IS initiatives.

2.5.5 Flexibility of Project Execution and Risk Management

While green IS capital and IS skill focus on technical and managerial IS capabilities, the flexibility concept focuses on project and risk management in such initiatives (Benaroch, Lichtenstein & Robinson, 2006; Cooper & Molla, 2017). As type 1 and type 2 green IS initiatives aim at reducing costs incurred by sustainable production, managing the risk of increased costs becomes relevant for green IS initiatives (Hanelt, Busse & Kolbe, 2017; Jenkin, Webster & McShane, 2011).

While managing negative risk has been established as an important factor, the lack of planned flexibility to act upon unplanned positive risk, i.e., opportunities, can also become a risk factor (Benaroch, Lichtenstein & Robinson, 2006). The inability to capitalize on unexpected opportunities can incur costs in terms of the opportunity cost of unrealized potential environmental and organisational performance improvements from green IS initiatives (Benaroch, Lichtenstein & Robinson, 2006).

2.5.6 Environmental Uncertainty

Finally, Benaroch, Lichtenstein and Robinson (2006) describe environmental uncertainty as a risk factor, which relates to changes in business and consumer requirements. Contrarily, green IS initiatives might benefit from uncertain prices for inputs, such as energy prices, as type 1 green IS initiatives aim at improving eco-efficiency (Carrillo-Hermosilla, del Río & Könnölä, 2010; Hertel & Wiesent, 2013).

2.5.7 Summary of Risk Factors

In sum, the risks presented in Benaroch, Lichtenstein and Robinson's (2006) OBRiM framework are relevant, but some factors are less significant for green IS initiatives than for non-green IS initiatives.

Although risks are an important factor for financial stakeholder perceptions of green IS initiatives, there are also several prerequisites for green IS initiatives, such as green IS capital and absorptive capacity, that enable these initiatives (Cooper & Molla, 2017; Molla, Cooper & Pittayachawan, 2011). These prerequisites will be covered in the following section as they also enable and constrain the adoption of green IS (Cooper & Molla, 2017; Molla, Cooper & Pittayachawan, 2011).

2.6 Prerequisites

This section will address the prerequisites for green IS initiatives through the concept of green IS readiness which refers to the organisational readiness to undertake green IS initiatives (Molla, Cooper & Pittayachawan, 2011). Green IS readiness is a term inspired by G-readiness described by Molla, Cooper and Pittayachawan (2011) regarding companies' readiness for green IT initiatives. From a financial perspective, green IS readiness plays an important role in influencing stakeholder perceptions of the risks and benefits of such initiatives, as companies with a greater green IS readiness are more capable of realizing benefits than other companies (Molla, Cooper & Pittayachawan, 2011).

Molla, Cooper and Pittayachawan (2011) originally applied G-readiness to green IT initiatives, however, the issues are also salient for green IS initiatives as IT is a part of IS per definition. Thus G-readiness can be translated into green IS readiness in terms of “[...] attitude, policy, practice, technology, and governance [...]” (Molla, Cooper & Pittayachawan, 2011, p.75). This translation of the G-readiness concept to green IS readiness is strengthened by Hedman and Henningson (2016) who confirm that green IS attitudes, governance and policy are also important for green IS initiatives. Additionally, Hanelt, Busse and Kolbe (2017) underscore the importance of supporting IS and infrastructure in terms of technology, which is also part of the G-readiness concept. Another component of readiness relates to the absorptive capacity of an organisation in identifying, assimilating, and using green IS knowledge in their initiatives (Cooper & Molla, 2017). They emphasize the relevance of IS-environmental absorptive capacity as a fundamental mechanism in allowing IS-enabled transformation to address environmental concerns. Cooper and Molla's (2017) work proposes a model in which factors such as long-term IS triggers, information exposure, and past experience might impact the development of IS-environmental absorptive capacity. Furthermore, Lane, Koka & Pathak, (2006) and Roberts et al., (2012) stress the fact that absorptive capacity is context-specific and may be found at both the firm and organisational unit levels.

From a macro-level perspective, it was pointed out by Thomas, Costa and Oliveira (2016) that the environmental context, including competitive intensity and regulatory backing, were more important than organisational or technology aspects in green IS initiatives. These readiness factors are complemented by the absorptive capacity theory from Cooper and Molla (2017), which will be addressed in greater detail in the next paragraph.

In summary, the implication of the green IS readiness concept means that prior exposure is beneficial for green IS initiatives, but not sufficient, since such initiatives depend on the ability of the firm to collect, assimilate and use new knowledge within the field (Cooper & Molla, 2017). The concept of prerequisites combined with the aspects of benefits and risks all affect the financial perspective, which will be addressed in greater detail in the following section (Nishant, Teo & Goh, 2017).

2.7 Green IS Initiatives From the Financial Perspective

This section will integrate the distinct, yet related perspectives of benefits, risks and prerequisites to address the investor's point of view which has a substantial impact on decisions regarding green IS initiatives (Hu et al., 2016). Several sources problematize green IS initiatives in this regard, citing an unclear, risky return on investment often with no short-term benefits leading to negative investor reactions (Bai & Sarkis, 2013; Chan & Ma, 2017; Chou, 2013; Przychodzen, Gómez-Bezares & Przychodzen, 2018).

Green IS initiatives differ from traditional, non-green IS initiatives in the sense that they typically lead to benefits that are long-term, non-financial, and multidimensional in the sense that they not only address economic sustainability but also environmental sustainability (Bai & Sarkis, 2013).

Thus, it becomes difficult for firms using traditional financial appraisal techniques such as discounted cash flow techniques to estimate the accrued business value of such initiatives (Bai & Sarkis, 2013; Chan & Ma, 2017). This applies especially to sustainable product and service

innovation projects that are penalized by investors due to their perceived doubtful profitability and risk profile (Nishant, Teo & Goh, 2017).

Other green IS initiatives have a value that is difficult to quantify. For example, ECMS which collects, store and disseminates data about environmental performance, can be used to market sustainability initiatives to improve eco-brand value and reputation, which are non-financial benefits (Graafland, Van de Ven & Stoffele, 2003; Perrini, Russo & Tencati, 2007; Zampou et al., 2022).

Furthermore, the marketing of environmental performance can have the opposite effect, since it can raise suspicions of greenwashing which could adversely affect brand value (Farooq & Wicaksono, 2021). In these cases, consumers tend to prefer silent sustainability, which means the practice of a firm moderating their environmental marketing claims or abstaining from making such claims (Farooq & Wicaksono, 2021). Apart from contributing to eco-brand value, ECMS can also contribute to verifiable compliance with standards and regulations, which is another example of a non-financial benefit as mentioned earlier (Chen, Boudreau & Watson, 2008; Corbett, 2013). In short, the business value of green IS initiatives can be difficult to quantify (Bai & Sarkis, 2013; Chan & Ma, 2017; Farooq & Wicaksono, 2021).

Conversely, the same stream of financial literature highlights the positive financial performance of green IS investments in the long run (Bai & Sarkis, 2013; Hertel & Wiesent, 2013; Nishant, Teo & Goh, 2017; Przychodzen, Gómez-Bezares & Przychodzen, 2018). However, the immediate reaction that follows a green IS initiative announcement is negative (Nishant, Teo & Goh, 2017; Przychodzen, Gómez-Bezares & Przychodzen, 2018). Despite this, Przychodzen, Gómez-Bezares and Przychodzen (2018), found positive lag effects, and this was especially true for ECMS initiatives (Nishant, Teo & Goh, 2017).

Finally, some financial stakeholders are willing to sacrifice wealth maximization for societal benefits, which also points towards a direct link between environmental performance and access to funding (Martin & Moser, 2016). While this section has addressed how challenges and non-financial benefits are inherent to green IS initiatives, signalling theory can contribute to understanding how these benefits and challenges are interpreted by investors (Nishant, Teo & Goh, 2017).

The following section intends to investigate the signalling theory and its applicability to green IS initiatives. By integrating this theory within the context of the current examination, the theoretical contribution of the study can be further developed, enabling a more in-depth analysis of green IS initiatives and their potential effects on businesses and the environment.

2.8 Signalling Theory and Its Application to Green IS Initiatives

The purpose of this section is to define signalling theory and place it within the context of green IS initiatives. Based on this conceptualization, the potential theoretical contribution of this study can be addressed in greater detail.

2.8.1 *Understanding Signalling Theory*

Signalling theory, originally proposed by Spence (1973), is a well-established framework for analysing the communication process between organisations and their stakeholders in the presence of a lack of transparency or incomplete information. Incomplete information and lack of transparency occur when one party has more or better information than the other, creating an imbalance in the decision-making process (Connelly et al., 2011). To bridge this information gap, organisations send signals to external stakeholders, such as investors, customers, or competitors. These signals provide insights into the internal characteristics, intentions, or performance of the organisation (Spence, 1973).

In the information systems field, signalling theory has been utilized to study various aspects, such as technology adoption, firm performance, and user behaviour (Li, Hess & Valacich, 2008). In recent years, researchers have begun to explore the application of signalling theory to green IS initiatives, investigating how organisations communicate their commitment to sustainability and environmental performance through signals, and how these signals impact investor perceptions and behaviour (Ainin, Naqshbandi & Dezdar, 2016).

2.8.2 *Types of Signals*

Signals can be classified into two main types: (1) intrinsic and (2) extrinsic signals (Connelly et al., 2011). Intrinsic signals are directly related to the organisation's internal characteristics, such as financial performance, corporate governance, or environmental policies. Extrinsic signals, on the other hand, are indirect and often originate from external sources, such as endorsements, certifications, or industry awards.

In the context of green IS initiatives, intrinsic signals might include the development and implementation of environmental and carbon management systems, investments in green technologies, or the establishment of sustainability-focused organisational units. Extrinsic signals, however, might involve receiving environmental certifications, participating in sustainability initiatives, or being recognized with sustainability awards.

2.8.3 *Signal Credibility*

The effectiveness of a signal in shaping financial stakeholder perceptions depends on its credibility (Connelly et al., 2011). Credible signals are those that are costly, difficult to imitate, or verifiable by third parties. For instance, obtaining environmental certifications like ISO 14001, which require rigorous audits and evaluations, can be considered a credible signal of an organisation's commitment to environmental performance. In the context of green IS initiatives, signal credibility plays a critical role in determining how financial stakeholders appraise the potential risks and benefits associated with the investment (Benbasat & Wang, 2005).

In summary, signalling theory provides a valuable lens to analyse the communication process between organisations and their stakeholders, particularly in the presence of information asymmetry. By understanding the types of signals and the factors that contribute to their credibility, this study will be better equipped to explore financial stakeholder perceptions of benefits and risk effects associated with green IS initiatives.

2.9 Application of Signalling Theory to Green IS initiatives

2.9.1 *Green IS Signals and Financial Stakeholder Perceptions*

Signalling theory can be applied to gain a better understanding of how investors perceive the benefits and risks associated with green IS initiatives. Announcements of green IS initiatives, such as the adoption of new sustainable technologies or the implementation of environmental management systems, act as signals to the market. These signals provide information about an organisation's commitment to sustainability and its potential impact on financial performance (Chang & Chen, 2013). These signals can be both intrinsic, such as the organisation's internal sustainability policies, or extrinsic, such as receiving environmental certifications (Connelly et al., 2011).

When organisations announce green IS initiatives, they are, in essence, sending signals to financial stakeholders about their commitment to environmental responsibility and the strategic importance they place on adopting sustainable practices (Chang & Chen, 2013). Financial stakeholders, in turn, use these signals to evaluate the organisation's environmental performance and its potential to generate long-term value (Chang & Chen, 2013). The credibility and strength of these signals play a vital role in shaping financial stakeholder perceptions, ultimately influencing their appraisal of the risk and potential benefits associated with the investment (Zheng, Liu & George, 2010).

2.9.2 *Financial Stakeholder Interpretation and Response to Green IS Signals*

Financial stakeholders can interpret and respond to green IS signals differently based on several factors, such as their individual investment preferences, environmental awareness, and the credibility of the signals (Connelly et al., 2011). Some financial stakeholders may prioritize short-term financial gains and may be less responsive to green IS signals. In contrast, others may be more environmentally conscious and value the long-term benefits of sustainable practices, leading them to view green IS initiatives more favourably (Ainin, Naqshbandi & Dezdar, 2016). The differences between these two types of investors can relate to the concept of calibration, which is the notion of different receivers interpreting the same signal differently (Connelly et al., 2011). In other words, two financial stakeholders may perceive the same announcement of a green IS initiative, depending on their environmental orientation (Connelly et al., 2011; Jenkin, Webster & McShane, 2011).

In this regard, Hilty and Aebischer (2015) describe two different views of environmental sustainability, the view of environmental, social, and economic sustainability as a balance, i.e., weak sustainability, and the view of business as nested within society and its natural environment, i.e., strong sustainability. While the former emphasizes an anthropocentric perspective, the second is environmentally focused and views business as a part of a societal and environmental whole (Hilty & Aebischer, 2015), which is illustrated in figure 1. below.

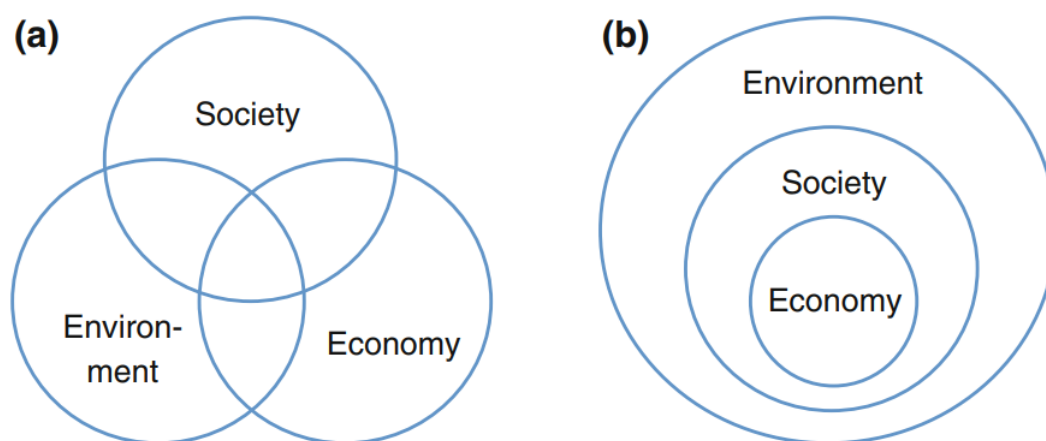


Figure 1. Two views of sustainability: a) the weak sustainability view, and b) the strong sustainability view from Hilty and Aebischer (2015).

The financial stakeholder response to green IS signals can have a direct bearing on the success of green IS initiatives. Positive financial stakeholder perceptions are important to attract financing which provides the necessary resources to implement and scale the green IS initiatives (Ainin, Naqshbandi & Dezdar, 2016). Conversely, if financial stakeholders perceive the risks associated with green IS initiatives as detrimental to competitiveness and organisational performance to a degree that exceeds potential benefits, shareholder attitudes may be less positive, limiting the organisation's capacity to implement the initiatives successfully (Hu et al., 2016; Loock, 2012). However, recent evidence suggests that the financial perspective is the primary consideration of financial stakeholders, pointing toward the weak sustainability view being the most widely held perception (Amel-Zadeh & Serafeim, 2018; Hilty & Aebischer, 2015).

2.10 Contribution of Signalling Theory to the Study

Applying signalling theory to the research problem at hand will provide valuable insights into the financial stakeholders' decision-making process regarding green IS initiatives. By investigating the relationships between announcements of green IS initiatives, financial stakeholder risk perceptions, and the potential benefits they anticipate, this study can contribute to the existing body of knowledge in several ways.

First, it will extend the application of signalling theory within the information systems field by focusing specifically on green IS initiatives. This application can pave the way for future research on the role of signalling in the context of sustainability and environmental performance, thereby broadening the scope of signalling theory in information systems research (Connelly et al., 2011).

Second, the study will identify key factors that influence financial stakeholder perceptions, such as signal credibility, the type of green IS initiatives, and financial stakeholder characteristics (Zheng, Liu & George, 2010). By understanding these factors, organisations can tailor their announcements of green IS initiatives more effectively, targeting specific investor segments and enhancing the credibility of their signals (Zheng, Liu & George, 2010). This, in

turn, may lead to more accurate financial stakeholder assessments of risks and rewards, ultimately promoting the successful adoption of green IS initiatives.

Third, by applying signalling theory to the study of green IS initiatives, this research will shed light on the role of information asymmetry in financial stakeholder decision-making (Melville, 2010). Understanding how financial stakeholders interpret and respond to green IS signals in the presence of information asymmetry can help organisations develop strategies to reduce this asymmetry, leading to more informed investment decisions and better-aligned stakeholder expectations (Spence, 1973).

In conclusion, based on the reviewed literature, signalling theory offers a robust and well-established theoretical foundation for investigating the perspectives of financial stakeholders towards green IS initiatives. By applying signalling theory to this study, the research will not only address the call for more research on the risk effects of green IS initiatives (Li, Hess & Valacich, 2008) but also contribute to existing literature on signalling theory in the information systems field, particularly in the context of sustainability and environmental performance.

3 Methodology

The purpose of this chapter is to outline the methodology of our study, which includes a discussion of the research philosophy guiding the investigation of the financial stakeholders' perception of green IS initiatives. Furthermore, the ethical considerations and scientific quality of the research will also be examined to determine the most appropriate approach for this study.

3.1 Research Philosophy

Before addressing the philosophical basis of this research project, the research question is relevant to reiterate: "How do financial stakeholders perceive the risks and benefits of green IS initiatives?" This question relates to how financial stakeholders perceive and value green IS initiatives. In other words, these perceptions can be considered as the meaningful reality that financial stakeholders construct around green IS initiatives (Patton, 2014).

The research question focuses on socially constructed realities within financial stakeholders as a group, which therefore points towards social constructionism being the appropriate epistemological approach (Patton, 2014). Furthermore, constructionism is useful in uncovering the power dynamics of different realities, by examining how a constructed reality may serve the interests of a particular group, in this case, financial stakeholders (Patton, 2014). In this regard Patton (2014, p. 121) also quotes Nietzsche: "All things are subject to interpretation. Whichever interpretation prevails at a given time is a function of power and not truth." This quote is relevant here since the research question also seeks to examine which interests exert the most power over the construction of reality among financial stakeholders regarding green IS initiatives.

Additionally, a social constructionist perspective is useful for understanding how financial stakeholders make sense of green IS initiatives, thus uncovering the factors behind perceptions of benefits and risks, as per the aim of the study.

Although there have been quantitative investigations into financial perceptions of green IS, such as Nishant, Teo and Goh's (2017) work examining stock price reactions, a social constructionist perspective can extend the theory and provide insights into the worldviews behind these reactions.

With this in mind, the social constructionist epistemology affects the ontological assumptions made. First, the concept of multiple realities is necessary to adopt for there to be multiple constructed realities that belong to different groups, such as the financial stakeholder's reality (Patton, 2014). This implies that different interview participants may have different experiences and that the generated theory must respect these differences instead of forcing consistency (Patton, 2014). Furthermore, the concept of multiple realities means that the researchers are not seen as objective and that they can only provide findings from their worldview, which will be disclosed in the thesis (Patton, 2014). The subjectivity and reflexivity of the researchers will be addressed by disclosing the researchers' preconceptions, biases and opinions regarding green IS initiatives and financial aspects in the thesis. For instance, one example of reflexivity included a favourable view of the financial aspects of green IS initiatives and strong sustainability perceptions, which may have introduced biases into the study. To

mitigate this risk, appropriate steps were taken to counteract this bias in terms of developing an appropriate interview and adapting the interview technique and the analysis approach.

3.2 Research Approach

Moving to the overall approach, the study leverages a literature review to conceptualize green IS initiatives and anticipate financial stakeholder perceptions toward green IS initiatives in the generated interview data, in line with the analytically inductive data analysis approach (Patton, 2014). This will both inform the design of an interview guide and the analysis of the generated data (Patton, 2014).

Additionally, financial stakeholders' perceptions of risks and benefits are the main focus of the study, which consequently influences the purposeful sampling strategy for recruiting participants (Patton, 2014).

For this reason, the most interesting participants are those that can represent the typical range of financial stakeholders. More specifically, the sampling strategy is a mix of a typical case sampling strategy (Patton, 2014, p. 268) and a sensitizing concept exemplars sampling strategy (Patton, 2014, p. 269). First, typical case sampling is a useful way to highlight what is normal among typical financial stakeholders, so that the findings of the study will become transferable and useful to cases external to the study (Patton, 2014, p. 268). Second, a sensitizing concept exemplars sampling strategy is also important since cases are selected based on the sensitizing concept of green IS initiatives (Patton, 2014, p. 269). Furthermore, a sensitizing concept exemplars sampling strategy helps find information-rich cases and adds depth to the investigation (Patton, 2014, p. 269).

Earlier, it has been hinted that the research aim is to generate a theory to improve alignment between organisations' green IS initiatives and the perceptions of its financial stakeholders. However, only financial stakeholders will be sampled, since financial stakeholder perceptions are the main focus of the study, however, these insights ultimately contribute to a theory that can help organisations align green IS investment announcements with financial stakeholders' interests by understanding these interests in detail.

Besides this, the issue of data management remains. Data management is especially relevant with audiotaped interviews which tend to generate large amounts of sensitive data (Patton, 2014). These data must be stored, transferred, managed and deleted in a secure, timely way to protect subject confidentiality, and this is also relevant in our case, because participants may be harmed if the raw data are disclosed (Patton, 2014).

The research approach also includes data collection in the form of interviews, analysis and ethical considerations, which will be described in the following three sections.

3.3 Data Collection Methods

This study utilizes a qualitative approach to gain a thorough understanding of financial stakeholders' perceptions towards green IS initiatives. In order to achieve this objective, research

methods, including semi-structured interviews, have been selected and aligned with the qualitative approach (Patton, 2014).

Interviews are a particularly effective method for qualitative research due to their ability to provide in-depth insights into subjective opinions and evaluations (Bhattacharjee, 2012; Bryman 2016). Furthermore, interviews are frequently utilized in this context due to their potential to generate rich, detailed data (Bryman 2016). During the data collection process, it will be important to take into account the potential risks and drawbacks of the interviewing method. These include reflexivity, in which participants may focus too much on what they think is expected of them (Recker, 2013), and the possibility of inaccuracy in reporting (Recker, 2013). To minimize these risks, the study will utilize a neutral and well-structured set of interview questions, minimize comments or judgments during the interview, transcribe the interviews in detail, and record them if possible (Recker, 2013; Patton, 2014). Furthermore, the interviews for this study were designed in a semi-structured format and conducted virtually (Patton, 2014; de Villiers et al., 2021).

While observation can be a valuable tool for studying behaviours and interactions (Patton, 2014), it was determined that it would not provide the level of detail or depth of analysis required to meet the timeline of this study. Instead, the decision was made to rely on in-person and virtual interviews as the primary means of collecting data, because the primary goal of the research is to obtain a deeper understanding of the perspectives of the financial stakeholders, and the role of macro-level factors in their decision-making processes.

To accommodate for potential language barriers, interviews were offered in Swedish or English according to the participant's preference. By offering these language options and the choice between physical and virtual formats, the study seeks to minimize any potential barriers to effective communication and participation.

3.4 Data Analysis Methods

Based on the data generated from the interviews described above, the recordings will be transcribed and analysed with an analytic induction approach (Patton, 2014). Gallivan and Depledge (2003) describe analytic induction as a method used to identify patterns within the collected data with the help of both predetermined and indigenous concepts applied through coding. Additionally, analytic induction is appropriate since it does not presume that the researcher is objective but enters the analysis with guesses and hypotheses based on a careful examination of relevant literature, which is consistent with the constructionist school of thought (Patton, 2014). In our case, an initial guess based on the literature might be that financial stakeholders are sceptical of green IS investments because they perceive them as risky and destructive to shareholder value (Nishant, Teo & Goh, 2017; Sadovnikova & Pujari, 2017). However, by staying grounded in the data and the reviewed literature, and by actively seeking to disconfirm hypotheses, initial preconceptions have only been used as useful entry points for analysis without them leading to closedness towards emergent concepts in accordance with analytic induction (Gilgun, 1995; Patton, 2014).

Analytic induction is also useful for tentatively proving causal relationships, which is relevant to the research question which seeks to uncover the factors that influence financial stakeholders' perceptions of green IS initiatives (Patton, 2014). However, causal explanations are

philosophically demanding to assert and require a carefully designed, rigorous, in-depth approach preferably including direct observation over time (Patton, 2014). Therefore, this study does not aim for universal explanations, but rather probabilistic, tentative assertions, and they will be clearly labelled as such.

Furthermore, this study will not aim to generate linear, causal explanations of the form “ x causes y ”, since this would be simplistic (Patton, 2014). Instead, social constructionist scholars advise taking individual particularities into account to ensure a fair representation of the views of those studied from an ethical perspective (Patton, 2014). Fair representation is also helpful for “consensual validation” of the findings, in which those studied, the reviewers and the researchers reach a consensus (Patton, 2014, p. 573). Holistic causal explanations can credibly describe this complexity and respect the particularities of each interviewee and worldview, and thus seem like an appropriate goal (Patton, 2014). The causal explanations that will be inferred from the collected data will be generated through an analytically inductive coding method, which is described in the following.

3.4.1 Coding

The coding method is based on the analytically inductive approach of cross-case pattern analysis (Patton, 2014). This mode of analysis initially focuses on finding consistent patterns and themes between themes, which requires an initial thematic analysis for each case (Ragin, 2008). Initially, themes are analysed based on predetermined concepts consisting of researcher assumptions and the reviewed literature alongside indigenous concepts that are grounded in the data (Patton, 2014).

These patterns and themes will result in somewhat consistent findings across cases, which are refined based on emergent findings in the data (Gilgun, 1995). However, the initial hypotheses are “sometimes rough and general approximations...” (Gilgun, 1995, p. 268), meaning that it is relevant to disconfirm and revise these. This relates to the other part of the analytically inductive analysis process, which consists of negative case analysis, in which researchers actively seek to disconfirm developed hypotheses with negative cases, yielding new insights (Gilgun, 1995).

Additionally, the coding process will be complemented by a member-checking process, which is described in the following section.

3.4.2 Member-Checking

The fact that multiple researchers and reviewers are analysing the data and critically reviewing findings can further increase the credibility of the analysis. Although interrater reliability has been heavily criticized within the constructivist research community, findings will still be member-checked, and checked by a critical friend, who is “... a trusted person who asks provocative questions, provides data to be examined through another lens and offers critiques of a person’s work as a friend.” (Lincoln & Guba, 1986; Costa & Kallick, 1993, p. 49; Morse, 1997; Patton, 2014).

In short, analytic induction was deemed to be the appropriate method to consider the researchers’ subjectivity and the particularities of each case. In this way, the study can tentatively

explain how financial stakeholders perceive the risks and benefits towards green IS in a holistic way.

3.5 Ethical Considerations

The ethical principles of confidentiality and informed consent are of utmost importance in this study for several reasons. First, confidentiality ensures that the personal and sensitive information collected from research participants is protected and not shared with others without their permission. This is important because it helps to build trust and respect between researchers and participants and helps to ensure that participants feel comfortable sharing their thoughts, feelings, and experiences (Patton, 2014).

Furthermore, informed consent is also crucial because it ensures that research participants are fully aware of the nature of the research and the possible risks and benefits associated with participation (Patton, 2014). By providing participants with this information, researchers can obtain their voluntary and informed consent to participate, which is essential for the ethical conduct of research (Patton, 2014). Excluding informed consent, research participants risk harm or exploitation, which can have serious consequences for both the participants and the reputation of research (Patton, 2014). It is also essential to consider the potential for interviewees to unintentionally reveal other pieces of sensitive information, and the importance of maintaining confidentiality in these instances (Patton, 2014).

To ensure the confidentiality of the data, access is restricted to only the authors and the interview participants, with each interview participant only having access to their transcript. Thus, transcripts are not made public prior to their pseudonymization and explicit approval from the interview participants, to uphold fairness and respect for all viewpoints. Furthermore, the study does not prioritize objectivity but rather strives to approach all views with respect and without coercion or pressure on the interviewees (Patton, 2014). In this regard, it is vital to accurately and fairly represent the views of the interviewees in the research findings (Patton, 2014).

3.6 Scientific Quality

Finally, the methodology section will end with relevant quality criteria for social constructionist research. As this mode of inquiry is different from traditional methods in social sciences, this requires different quality criteria than the traditional ones such as internal validity and generalizability (Lincoln & Guba, 1986; Patton, 2014).

First, the study will strive towards credibility which relates to how well the interpretations in the study reflect the participants' worldviews instead of internal validity (Patton, 2014). Credibility is related to respecting the particularities of each case and not reducing them to simplistic, linear interpretations. Second, the study will strive towards transferability, in which interpretations have to be detailed enough for the readers to judge for themselves whether they can transfer the findings from the cases studied to their case instead of generalizability (Patton, 2014). Third, the constructionist style of inquiry used means that objectivity is rejected as a

quality criterion. Confirmability takes its place, which means that the research must and will strive to link interpretations and assertions to the collected data in a clear way (Patton, 2014).

Another criterion is reflexivity which is both the awareness and disclosure of the researchers' subjectivity as well, and this can help make sampling, data collection and analysis fairer (Patton, 2014).

Finally, reflexivity is also a transparent account of how subjectivity might affect the study (Patton, 2014). In our case, an example of reflexivity is the disclosure of one of the researchers' potential positive judgments of green IS, which prompts the researchers to be careful to reserve judgment when interviewing and analysing data to ensure openness (Patton, 2014). Reflexivity is also the honest disclosure of how subjectivity can affect the results of the study to allow the reader to judge for herself when reading the thesis (Patton, 2014). Finally, there is the constructionist criterion of trustworthiness, a sort of meta-criterion which is partly based on the previously mentioned strategies such as triangulation and member checking (Lincoln & Guba, 1986). It is also based on prolonged engagement (Lincoln & Guba, 1986). However, this is a challenge due to the timeframe of the thesis period. An in-depth interview, however, is still a viable way of establishing trust and generating rich data (Lincoln & Guba, 1986; Patton, 2014). Additionally, with careful observation during the interview, the salience of interview responses can be assessed (Lincoln & Guba, 1986; Patton, 2014).

In short, this section has covered some of the most significant quality criteria for constructionist research, which apply to this research proposal. These are credibility, transferability, confirmability, reflexivity, and trustworthiness (Lincoln & Guba, 1986; Patton, 2014).

4 Results

This section will provide an overview of the results of the analytic induction process applied to the data generated in our interviews. Firstly, the section will provide an overview of the participants in the study and their backgrounds, followed by a section exploring their environmental orientation, including the perceived relation between business value and sustainability.

Based on these background sections, the main part of the results section will be devoted to the identified financial stakeholder perceptions regarding the value and risks of green IS initiatives. This account is divided into sections pertaining to environmental and carbon management systems (ECMS) initiatives and transformative green IS initiatives, respectively.

To ensure the confirmability of findings, the findings presented in the following sections will be linked directly to specific references in the appendices containing transcribed and coded interviews. The references will refer to specific participants and a line number, as the appendices are structured as tables containing several rows. For instance, to refer to a statement made by the second participant on the fifth row in the table, the reference would be “(P2:5).”

4.1 Overview of Participants

This section will provide a context in terms of the participants’ roles and experience within the field of sustainability, finance and green IS.

The sample contains seven participants engaging in interviews with a duration of 30-50 minutes, generating in-depth, rich data regarding their perceptions of green IS initiatives and related benefits and risks.

Most participants possess senior roles and have extensive professional experience within finance and information technology, which contributes to the transferability of the cases in this research to other financial stakeholders (P1:2, appendix 9, P3:2, P4:4, P6:12 & P7:2). To increase the breadth of cases, a junior role (P5:2-3) was also selected for participation to find commonalities between a diverse set of cases, which also is helpful for the transferability of findings. In other words, the in-depth interviews and the broad range of profiles among the participants ensured appropriate depth and breadth for the study (Patton, 2014).

In short, the sample consists of a purposefully broad selection of financial stakeholders to ensure relevance with the research question regarding their perceptions of the benefits and risks of green IS initiatives. However, these perceptions are to a large extent contingent upon their environmental orientation, which is the topic of the following section.

4.2 Environmental Orientation of Financial Stakeholders

This section focuses on the environmental orientation of financial stakeholders and their views on the intersection between environmental sustainability and business value.

Most of the participants shared an urgent perception of climate change and environmental sustainability issues (P1:8, P2:31, P4:28 P5:15, P6:36). However, P3:11 has a more pragmatic view of companies today, as he found them to be performing as well as could be expected environmentally, and that the view of environmental sustainability ought to be tempered with a gradual sustainability transition approach.

Building upon the broad findings in terms of environmental sustainability, the following section will unpack financial stakeholder perceptions of the relationship between environmental sustainability and business value.

4.2.1 Sustainability vs. Business Value, Intersections and Divergences

This section will elaborate on the previously addressed sustainability perceptions and unpack their relation to business value. In this regard, three major themes have been identified, namely synergies, trade-offs and sectoral differences, as this relation is context- and industry-dependent (P4:25 & P6:27-28).

4.2.1.1 Synergies

The synergies identified span a broad number of topics, but the most prevalent themes include long-term adaptation to a changing market (P2:104, P2:120, P6:86), mitigating environmental sustainability risks (P1:81, P1:83, P1:90, P2:99), improved control over operations (P1:80, P1:82, P2:99, P6:42), improved compliance (P1:49, P2:42, P6:100), product differentiation (P2:104, P2:122, P6:86), cost savings for eco-efficiency (P2:3, P6:36), and credibly signalling a commitment towards sustainability to attract financing (P2:75-76).

4.2.1.2 Trade-Offs

While the previous section describes a positive relationship between environmental performance and business value, there are also significant challenges to face such as short-term costs (P1:25, P5:44, P6:27), unclear business value (P2:88), unclear returns (P1:84, P2:105), and decreased competitiveness due to higher price points of sustainable products and services (P1:116-118). Additionally, P3:9 and P4:25 note that the petrochemical industry is an inseparable part of industrialized society, meaning that some negative impact is difficult to avoid. However, these are also the sectors in which the greatest potential to reduce environmental impact can be realized through engagement activities (P4:25).

4.2.1.3 Sectoral Differences

Although the synergies and trade-offs identified above are general in nature, their specific implications are highly context- and industry-dependent as mentioned by P6:27-28. Especially tertiary industries have a small direct environmental impact, while secondary industries are extensively entangled in resource-intensive structures with large emissions of greenhouse gases (P3:33). Based on this fact, some see tertiary industries, such as finance, contributing to environmental sustainability not through their direct impact, but through their indirect impact and leverage toward their debtors and their investments (P6:85).

Although the issues above are general, they do have relevance for green IS initiatives as well, which will be explored in the following section.

4.3 Perceptions of Green IS Initiatives

The focus of this section is the financial stakeholder perceptions of green IS initiatives in terms of perceived advantages, risks and challenges. The remainder of the section will be divided into subsections regarding environmental and carbon management systems (ECMS) initiatives and transformative green IS initiatives.

4.3.1 Environmental and Carbon Management Systems Initiatives

The interviewees perceive ECMS initiatives as instrumental in monitoring environmental performance and are mandated by new EU reporting directives (P1:126, P2:42, P6:100). However, they also give rise to several data quality and standardization challenges (P1:38, P2:56, P5:45, P6:50).

4.3.1.1 Perceived Advantages

The interviewees unanimously agree upon the clear business value of ECMS initiatives, while the effect on environmental performance is indirect and less clear (P4:38). One interviewee puts it in the following way: “*but ... what matters and what will stop climate change is that we actually reduce greenhouse gasses in the atmosphere.*” (P4:50). In other words, these systems informate both operations internally and financial stakeholders externally, but they do not necessarily bring about change (P4:38, P6:45).

However, ECMS are valuable since they enable the quantitative assessment of environmental performance (P1:37, P2:40). P1:64, P2:72, and P6:43 stress the value of verifiable information in improving the accuracy of environmental performance assessments, and in reassuring financial stakeholders and the market to avoid greenwashing accusations. P2:73 extends this claim further, stating a preference for silent sustainability, i.e., the practice of companies that do not overly advertise their environmental performance. Despite these risks, firms also tend to leverage environmentally sustainable practices for marketing in a quest for recognition (P7:16). In summary, verifiable data is seen as a particularly interesting feature of ECMS initiatives which builds confidence in environmental performance signals, and helps companies effectively broadcast their environmental performance.

In terms of verifiability, the integration of ECMS into ERP systems centralize environmental data, facilitates data consolidation and eases the management of data (P1:36, P2:43, P3:25). In addition, the use of sensors in such a system can contribute to the accuracy of environmental data and ensure their objectivity (P1:80).

This integrated system providing a timely supply of objective, precise and verifiable data is also critical to effective stakeholder management to effectively prevent and respond to adverse environmental incidents and mitigate them effectively (P1:99, P2:99). In other words, verifiable information not only helps in accurate environmental performance assessments, but also contributes to risk reduction. By offering reliable data that can withstand stakeholder scrutiny, ECMS initiatives can aid in mitigating the risks associated with adverse environmental incidents, inaccuracies, and greenwashing accusations (P1:81, P2:99).

Furthermore, verifiability also contributes to third-party environmental sustainability audits and certifications which can increase credibility further (P1:65, P5:66). Interviewees stress the

fact that these are done by actors external to the organisation, making for an extrinsic signal, which they associate with superior credibility (P1:65, p5:66).

In sum, ECMS provides value to financial stakeholders through external certifications and verifiable environmental data that is aggregated into quantitative environmental performance indicators. This quantitative assessment is something financial stakeholders appreciate since they often have a large number of assets, and this enables rapid environmental performance assessments (P1:72, P2:40). As P1:63 puts it:

“Investors are at one step up in the... chain if you like. Like, I don't think they necessarily care what sort of sensor you use or what sort of system you use” (P1:63)

In addition to this rapid, quantitative assessment of environmental performance, some interviewees disagree and stress the need to supplement quantitative evaluations with detailed analyses to ensure and critically assess environmental performance (P2:79-82, P6:79-80). However, it seems that financial stakeholders doing so tend to have a stronger environmental orientation, pointing to this being an important factor in determining the level of detail in analysis (P2:79-82).

However, interviewees also note significant challenges in conjunction with these initiatives, which will be uncovered in the following subsection.

4.3.1.2 Recognized Risks and Challenges

Interviewees note that issues regarding data quality (P1:38, P5:45, P6:50), data consolidation (P3:33, P6:52), and the challenging process of developing standards (P1:46, p3:33, p7:21-22), adversely affect the execution of ECMS initiatives. Despite the challenges of developing common standards, P7:39 emphasizes the importance of striving to create commonly accepted standards despite these challenges, since he sees such standards as critical. He compares the necessity of standards to everyone speaking the same language:

“We're talking a lot about environmental sustainability ... [b]ut we need to speak the same language when we talk about it... I think that ... the biggest problem right now is that people are speaking in their own tongue, so to speak, from their point of view.” (P7:39).

P6:106 extends this topic of speaking a shared language, since he stresses the importance of shared standards for assessing environmental performance to facilitate fair comparisons between companies. Still, P7:24's experience points towards the reluctance of industry actors to formulate standards and their tendency to wait for regulators to provide such standards. In other words, regulation is not merely a coercive tool to force companies into reporting sustainability data, it is also an enabler for commonly accepted standards, which is subject to new EU directives according to P6:106.

Although these technical issues regarding data and standards are not of a direct financial nature, interviewees still express concern regarding data quality and standardization (P1:46, P2:54). This concern pertains both to the quality of the data that are used to assess environmental performance as well as the challenge of consolidating data from multiple sources within and outside the organisation (P3:33, P6:52). Particularly external data sources from other firms in the supply chain are described as challenging (P3:33, P6:52). A closely related issue is that of standardization, since different standards may imply different methods of calculating environmental performance indicators depending on individual company practices

(P7:17). Thus, these environmental performance indicators become incommensurable, complicating the decision processes of financial stakeholders, for example when comparing potential investments or loans (P1:39, P6:106).

Additionally, some interviewees note that such initiatives result in change impacts such as the redesign of processes and existing IS (P1:55-57, P3:23). While the change impact is an issue in its own right, it also points to the issue of such initiatives requiring significant amounts of resources in the short term, potentially burdening companies financially in the short run (P1:25, P5:44, P6:27).

Nevertheless, most interviewees refer to the fact that ECMS and similar green IS for reporting are becoming compulsory within the EU due to new directives such as the Corporate Sustainability Reporting Directive (CSRD) and the Sustainable Finance Disclosure Regulation (SFDR) (P1:49, P2:42). In other words, the barrier to adopting such systems is becoming a non-issue for a growing number of firms, which also applies to firms outside of the EU (P1:49, P6:102).

However, other classes of green IS initiatives are not subject to these directives, and they include the transformative class of green IS initiatives that enable novel, environmentally sustainable business models, which will be discussed in the next subsection.

4.3.2 Transformative Green IS Initiatives

The transformative class of initiatives are characterized by their more radically innovative nature, which results in interviewees noting both advantages, risks, and challenges.

4.3.2.1 Perceived Advantages

The advantages that interviewees see are primarily improved innovation capabilities (P3:8, P6:86) and exploiting increasing market opportunities for environmentally sustainable business models and products (P2:122). The future market opportunities for sustainable businesses consist of both increased customer bases due to market demand and regulation motivating companies to increase their environmental performance (P7:37). P7:7 extends this concept by stating that environmental performance is not just associated with market opportunity, it is essential for companies to maintain their license to operate. However, environmental performance is not achieved merely through eco-efficiency but instead through generating a positive ecological impact, for instance through circular business models enabled by green IS (P2:4, P6:86).

However, these benefits are difficult to realize, which is reflected in the following subsection regarding the challenges of transformative green IS initiatives.

4.3.2.2 Recognized Risks and Challenges

The transformative initiatives addressed in this section are seen as prone to failure, and they require nonstandard, bespoke IS (P2:61). Furthermore, business value in terms of profits may be seen as unclear or vaguely communicated by the implementing company (P2:64). The combination of unclear benefits and the elevated possibility of the business model failing make this class of initiatives particularly exposed to risk according to most participants (P2:64). This increased risk is consequently translated into a financial expectation of an increased risk premium, leading to a drop in share prices according to P5:91. Additionally, there

is also the risk that the products provided by these companies with transformative ambitions come at a higher price point, which would additionally detract from the competitive position of companies (P1:115-118). Along the same vein, lower returns would detract from financial stakeholder perceptions of the company (P2:12, P4:26, P5:91).

In other words, several participants experience that environmental performance that comes at the price of a higher product price point or decreased financial returns is unattractive (P2:12, P4:26). As P1:114 phrased it: “*the market’s probably right...*” However, this is a contested fact since P7:6 points out that an increasing number of consumers are willing to pay a sustainability premium for sustainably produced products and support environmentally sustainable business models. Additionally, P7:37 points out that the investment company he is working for is open towards sacrificing returns and accepts slightly higher price points to generate a positive environmental impact. In other words, it appears that the risk perceptions of transformative green IS initiatives depend on the environmental orientation and conservatism of the financial stakeholders, meaning that conservative stakeholders tend to react more apprehensively while stakeholders subscribing to a strong sustainability perception are more willing to sacrifice returns and accept higher price points (P2:24, P7:6, P7:37).

4.4 Summary of Key Findings

The results from the interviews shed light on financial stakeholders’ perceptions of ECMS initiatives, the integration of these systems into ERP systems, and transformative green IS initiatives.

First, this summary will address perceptions related to ECMS initiatives and their integration into ERP systems in organisations, while the second part will address the transformational class of green IS initiatives.

4.4.1 ECMS Initiatives

Regarding ECMS initiatives for monitoring, interview data underscore the importance of verification, where financial stakeholders see value in companies that prioritize the capability to document environmental sustainability data in a verifiable way. In this regard, the integration of ECMS into ERP systems brings additional advantages. It centralizes environmental data, making data management easier and facilitates data consolidation. Furthermore, the use of sensors contributes to the accuracy and objectivity of environmental sustainability metrics. The perceived value of such initiatives primarily relates to reporting capabilities, which are important in mitigating environmental risks and responding to adverse environmental incidents and countering greenwashing allegations.

In addition to leveraging environmental sustainability data internally, the data derived from ECMS and related integrations into ERP systems can benefit stakeholders as well. Stakeholders are provided with verifiable, objective and accurate data, leading to effective stakeholder management and risk reduction through increased control over processes and environmental impact. Interviewees also saw third-party environmental sustainability audits and certifications as crucial supplements to internally verifiable data.

Finally, the quantitative nature of environmental sustainability assessments derived from ECMS are appreciated by financial stakeholders, who often have a large number of assets and hence need to rapidly assess environmental performance.

Despite the benefits of this quantitative approach to evaluating environmental performance, the interviewees link noteworthy challenges to this class of green IS initiatives. These challenges revolve around data quality, data consolidation, and the development of common standards. The interviewees express concerns about the quality of the data used to assess environmental performance and the challenge of consolidating data from multiple sources, particularly from external data sources from other firms in the supply chain. Moreover, the lack of standardized methods for calculating environmental performance indicators makes comparison across companies difficult for financial stakeholders. This lack of standardization hampers decision-making processes and could adversely affect the ability of financial stakeholders in comparing different companies in terms of environmental performance.

Another significant issue brought up in the interviews relates to change impacts, which could require redesigning processes and existing IS. This redesign could demand considerable short-term resources, financially burdening the companies undertaking ECMS initiatives. However, the interviewees recognize that ECMS and similar green IS for reporting are becoming mandatory in the EU due to new directives such as the Corporate Sustainability Reporting Directive (CSRD) and the Sustainable Finance Disclosure Regulation (SFDR). These directives imply that the barrier to adopting such systems is becoming less significant for an increasing number of firms.

4.4.2 Transformative Green IS Initiatives

This segment of the summary moves beyond the reporting aspect and delves into the transformative green IS initiatives. These initiatives are marked by their radically innovative nature with benefits such as improved innovation capabilities and exploiting market opportunities for environmentally sustainable business models and products. However, these initiatives are not devoid of risk. They are prone to failure, require bespoke green IS, and the business value in terms of profits may be unclear. Furthermore, the products from these initiatives may come at a higher price point, which could negatively impact the competitive position of the companies. The combination of these risks could, for instance, lead to a drop in the company's share prices and detract from financial stakeholder perceptions of the company.

Notwithstanding these risks, one interviewee posits that an increasing number of consumers are willing to pay a sustainability premium for sustainably produced products. Some investment companies are also open to accepting slightly higher price points to generate a positive environmental impact. This suggests a heterogeneous risk perception among financial stakeholders, with more conservative stakeholders tending to react more apprehensively, while financial stakeholders with a strong sustainability perception are more willing to accept the risks.

In summary, the results from the interviews present a complex picture of the advantages, risks, and challenges of integrating ECMS into ERP systems and the transformative nature of green IS initiatives. These insights highlight the interconnection between the themes of reporting, verification, stakeholder management, risks, data management challenges and standardization issues. They point to the need for a balanced approach towards adopting such systems,

taking into consideration the technical issues around data quality and standardization, and the risks associated with transformative green IS initiatives. The role of EU regulatory directives is also emphasized, signifying their influence in shaping the future landscape of corporate sustainability reporting and its verification.

5 Analysis and Discussion

Transitioning from our analysis, it is essential to now turn our attention to the key findings and their implications in the context of sustainability and financial practices. This discussion explores the role of monitoring systems, the complexities of supply chain transparency, and the different attitudes of financial stakeholders towards sustainability.

First, we will examine financial stakeholders' environmental orientation, followed by a critical evaluation of the gap between what financial stakeholders say about their commitment to sustainability and what they do, taking into account the concepts of green and black markets.

Consequently, we will investigate how tools like environmental and carbon management systems (ECMS) and enterprise resource planning (ERP) systems can provide reliable sustainability data, informing financial stakeholders in their decision-making.

Following this, we will address the benefits and obstacles that come with implementing ECMS. This includes the impact on investor confidence and risk management, as well as potential difficulties related to operational changes.

Lastly, we investigate the challenge of ensuring transparency and reliability of sustainability data within the supply chain, extending our examination beyond individual companies to include their network of suppliers.

5.1 Exploring the Environmental Orientation of Financial Stakeholders

An important dimension in the discourse on sustainable finance emerges when considering the environmental orientation of the financial stakeholder. In accordance with the principle of calibration, the attitude of the investor towards environmental sustainability can significantly influence their investment decisions, determining the degree to which they engage financially in green markets, which are driven by environmentally friendly and sustainable practices, or black markets, generally characterized by traditional, less sustainable industries.

Several study participants claimed that many investors claim a high-level view of firms due to the sheer volume of firms they deal with. This high-level perspective is connected to a reluctance to delve into the granular details of a firm's sustainability practices, which might therefore diminish the perceived value of sustainable practices in the eyes of the financial stakeholders. Thus, this extends the concept of calibration from Connelly et al. (2011) so that environmental orientation determines what types of information and signals financial stakeholders actively search for, as opposed to the signalling theory view of financial stakeholders as passive recipients of signals (Ainin, Naqshbandi & Dezdar, 2016; Spence, 1973).

However, other participants disagreed with the previous focus on the high-level perspective, and they suggested that certain investors have a strategic reason to delve into the details of sustainability, especially those with a stronger environmental orientation. For these investors, the sustainability of a company, as evidenced by data provided by systems such as ECMS and ERP systems, could have a substantial impact on their investment decisions. Such contrasting

views bring the environmental orientation of the financial stakeholder into sharp focus. They highlight the diversity in attitudes and strategies among investors, pointing to a spectrum of environmental orientations rather than a binary division. This perspective calls for a critical examination of the role that the environmental orientation of financial stakeholders plays in influencing financing decisions and the level of detail in their assessment of companies.

In essence, the environmental orientation of the investor adds another layer of complexity to the discourse on sustainable investment. It suggests that the influence of sustainability data on investment decisions is not merely a function of the data itself but is also significantly shaped by the investor's environmental orientation. Recognizing this complexity is crucial to developing a more nuanced understanding of the dynamics of sustainable investment.

5.2 The Sustainable Investment Dilemma: Unveiling the Gap Between Declarations and Actions

While the environmental orientation of a financial stakeholder is a critical factor, it is equally essential to consider the reality of financing decisions. Even among stakeholders who express a strong commitment to environmental sustainability, there may be a discrepancy between their declared orientation and their actual investment practices. Participants typically explain these discrepancies with the crucial role of resource-intensive and high-emitting sectors in society, such as the petrochemical industry, and therefore the need to finance it. At the same time, it is seen as an opportunity to engage in such sectors and influence them.

The potential disconnect between attitude and action invites a critical evaluation of the alignment between a financial stakeholder's declared commitment to sustainability and their actual investment decisions. It raises a pertinent question about the genuineness of these investment choices. Are they a reflection of a sincere commitment to sustainable practices through active ownership and using financial leverage to pressure companies toward sustainable practices? Or do they primarily echo the allure of investment returns? As these aspects are explored, it is crucial to recognize that a range of factors likely influence the decision-making process beyond the investor's environmental orientation.

Moreover, the decision-making process is likely influenced by a range of factors beyond the investor's environmental orientation. For example, the financial stakeholder's risk tolerance, the availability of reliable sustainability data, and the financial stakeholder's confidence in the company's management could all shape financial decision-making. In other words, the usefulness of signalling theory is extended to not only investors, but also to other financial stakeholders, since the availability of sustainability data relates to the information asymmetry between financial stakeholders and the companies they finance (Spence, 1973).

Furthermore, the notion of green versus black markets introduces another layer of complexity. While the appeal of green markets is growing, the reality is that many investors still have significant holdings in black markets. For these investors, the transition to green investments may require not only a shift in their environmental orientation but also a re-evaluation of their investment strategies and risk tolerance.

Overall, this discussion highlights the complexity and multidimensionality of the investment decision-making process. While the environmental orientation of financial stakeholders is

undoubtedly a significant factor, it is not the sole determinant of financing decisions. Recognizing this complexity is crucial to understanding the dynamics of sustainable investment and developing strategies that can effectively encourage a shift towards more sustainable investment practices.

5.3 The Influence of Monitoring Systems and Standardization on Financial Stakeholder Decision-Making

The perception of the participants in the study was univocal - they highlighted the potential of monitoring systems and standardization as encouraging mechanisms for financial stakeholders to finance sustainable technologies. This unanimity of opinion underscores the rising importance placed on corporate transparency and verifiable data in guiding financing decisions. However, this perceived influence demands a critical lens. Given the complexity and variability of financial decisions, it seems prudent to question the assumed universality of this influence. While monitoring systems and standardization may enhance the credibility of environmental signals and facilitate the quantification of a company's carbon footprint and CO₂ emissions, their sway on financial stakeholders' financing decisions may not be as straightforward as initially perceived.

Financial stakeholders have multiple considerations when investing, and the extent to which they attribute importance to returns on investment as a primary determinant is typically influenced by environmental orientation. Thus, the inclusion of sustainability considerations, as enabled by monitoring systems and standardization, into this decision-making process may not necessarily translate into more financing for sustainable technologies, as different levels of environmental orientation affect the interpretation process of financial stakeholders. The assumption that these technologies would invariably encourage financial stakeholders to invest in sustainable options, therefore, calls for critical evaluation. This perceived influence must be contextualized within a broader investment landscape marked by competing interests, varied financial risks, and differences in rates of return for potential investments. The interaction between these factors, and their collective impact on the decision-making process of financial stakeholders, introduces a layer of complexity that challenges the simplicity of the initial perception.

Considering this, it becomes imperative to scrutinize the intersection of monitoring systems, standardization, and sustainable investment decisions. To what extent do these systems and standards influence the decision-making processes of financial stakeholders? Do financial stakeholders view them as fundamental determinants or merely additional information in an already complex process? These questions point towards the need for a nuanced understanding of the dynamic between financial decision-making and sustainability considerations, beyond the unanimity of initial perceptions.

5.4 High-Level View vs. Detailed Data Analysis: The Financial Stakeholder's Dilemma

The financial stakeholder's investment decision-making process is often delineated by a dichotomy between a high-level view and a detailed view with careful data analysis. Many

participants in the study purported that financial stakeholders typically adopt a high-level view of data when making investment decisions.

This perspective suggests that these stakeholders prioritize a broad, overarching comprehension of investment prospects rather than delving into the specifics and details of the data at hand.

Critically examining this claim, we might ask: what are the implications of such an approach on the perceived effectiveness of monitoring systems and standardization? If financial stakeholders lean towards a high-level understanding of data, the nuances that monitoring systems and standardization bring to the table may potentially be overlooked. A macro-level perspective may not capture the depth and richness of the data these systems and standards provide. On the other hand, such monitoring systems can boost the credibility of sustainability data from the financial stakeholder's perspective, and thus enable a quantitative, high-level sustainability assessment which many participants appreciate.

In this context, however, the question of whether the primary aim of financial stakeholders – securing returns on investment – might overshadow the relevance of sustainability data in investment decisions, gains prominence. If the pursuit of financial returns takes precedence, the value of detailed, sustainability-related data could be relegated to a secondary position in the decision-making process, and again, this points towards the influence of environmental orientation on financial stakeholder interpretations of the companies that they evaluate.

However, the binary characterization of financial stakeholders' perspectives as either high-level or detail-oriented might oversimplify the complexities of real-world investment processes. In reality, financing decisions are likely influenced by a mix of factors, potentially including both high-level assessments and detailed data analysis. The relative importance of these aspects may vary across stakeholders, contingent on their specific investment strategies, risk tolerance, and sustainability orientations. Thus, the dichotomy between a high-level view and detailed data analysis introduces a significant dimension to our understanding of the financial stakeholder's decision-making process. It highlights the need for a more comprehensive and nuanced comprehension of how data provided by monitoring systems and standardization is perceived, processed, and incorporated into investment decisions. Ultimately, the effectiveness of these systems and standards in shaping sustainable investment decisions may hinge on the delicate balance between the high-level view and detail-oriented perspective adopted by financial stakeholders.

5.5 Benefits of ECMS: Enhancing Financial Stakeholder Confidence and Reducing Risks

In the endeavour towards greener investments, the utility of environmental and carbon management systems (ECMS), which monitor and track environmental performance, is gaining recognition (Corbett, 2013). Participants in this study identified ECMS as a tool that can enhance the confidence of financial stakeholders in environmental sustainability signals by increasing credibility by providing verifiable environmental performance indicators (Benbasat & Wang, 2005; Connelly et al., 2011). By serving as a reliable source of environmental data, ECMS can substantiate a company's sustainability initiatives, thereby adding credibility to their claims (Benbasat & Wang, 2005; Connelly et al., 2011). This in turn can potentially

sway financial stakeholders towards environmentally oriented financing, including financial stakeholders that rely solely on a high-level perspective for decision-making.

In addition to bolstering investor confidence, ECMS may also enable companies to reduce risks and exert better control over their business processes. By monitoring and reporting discharge and environmental data in near real-time, ECMS allow for quick detection and mitigation of environmental issues such as spills, leaks, or other disasters, which is closely related to the capability of green IS to manage environmental output (Seidel, Recker & vom Brocke, 2013). This capability can translate into enhanced control over environmental performance, reassuring stakeholders and providing a competitive advantage in attracting financing.

However, it is important to critically evaluate the perceived benefits of ECMS. While ECMS may offer tangible advantages, these benefits are contingent on their effective utilization and the accuracy and reliability of the data they generate. There is a risk of undue reliance on ECMS data without a concurrent emphasis on other critical factors such as organisational commitment to environmental responsibility and sustainable supply chain practices. Thus, while ECMS can potentially serve as a powerful tool in promoting green investments, their use needs to be part of a broader, comprehensive sustainability strategy.

5.6 The Limitations and Challenges of ECMS Initiatives

Despite the potential benefits of environmental and carbon management systems (ECMS), it is important to acknowledge that they are not a panacea for all sustainability-related challenges. ECMS can be instrumental in providing valuable data and offering insight into environmental performance, but they are essentially diagnostic tools; they can identify where problems lie but do not inherently provide solutions. The effective resolution of identified issues still requires strategic action and a commitment to sustainable practices at all levels of the organisation.

Moreover, the implementation of ECMS introduces a new set of challenges, notably in terms of changing operations and data flows. This is consistent with Bengtsson and Ågerfalk's (2011) conceptualization of green IS as a change actant that requires significant changes to existing processes and IS architecture, potentially disrupting operations in the short term. This issue is confirmed further in digital innovation literature, as ECMS initiatives can be seen as examples of digital innovation, which potentially can challenge the stability and integrity of existing IS infrastructure (Park, Pavlou & Saraf, 2020).

In addition to operational challenges, ECMS initiatives also incur costs. These costs include not only the direct expenses of purchasing and installing the systems, but also indirect costs associated with training, systems integration, and potential disruptions to operations during the transition phase.

Finally, there are risks associated with changes in data architecture and the potential for poor-quality data. If ECMS data are inaccurate or misleading, this could lead to faulty decision-making or even greenwashing scandals, posing a significant reputational risk for the company, which is consistent with Farooq and Wicaksono (2021).

On balance, the benefits of ECMS need to be weighed against these challenges and risks. A balanced approach to implementing ECMS includes a thorough assessment of the organisation's readiness for change, the availability of resources for implementation and ongoing support, and the potential impact on operations and stakeholder relations. The importance of these concepts further confirms the relevance of a green IS readiness concept, although traditionally the G-readiness concept only has been applied to green IT initiatives (Molla, Cooper & Pittayachawan, 2011). The effectiveness of ECMS in promoting green financing will ultimately depend on how well these systems are integrated into the broader sustainability strategy, into existing information systems such as ERP systems, and the operational practices of the organisation.

5.7 Questioning the Transparency and Reliability of Sustainability Data from Companies and Their Suppliers

The issue of data transparency and reliability is pivotal to the discourse on corporate sustainability. The study participants highlighted that while a company's data might portray it as sustainable, the sustainability practices of its suppliers might tell a different story. This dichotomy raises important questions about the credibility of the sustainability data presented by companies and the actual sustainability of their operations.

This broader view acknowledges that a company's sustainability impact is shaped not just by its actions, but also by the actions of the entities it is connected to within its supply chain. Thus, a company's claim of sustainability is only as robust as the sustainability practices of its suppliers. This is also consistent with Yang et al.'s (2018) analysis of green supply chain management systems, which are dependent on extensive coordination activities across the entire supply chain to accurately evaluate environmental performance.

However, it becomes increasingly challenging to verify sustainability claims when we move down the supply chain, with each tier adding an extra layer of complexity. The gap between the presented sustainability data and the actual sustainability practices of suppliers calls into question the reliability of the data. This discrepancy not only undermines the perceived sustainability of companies but also threatens the trust that financial stakeholders place in them.

Therefore, the reliability and credibility of sustainability data provided by companies can be called into question. In a similar vein, the negative impact of suppliers not adhering to sustainable practices on the company's own sustainability efforts gains importance. These critical issues underscore the pressing need to critically assess the sustainability claims of companies. The process requires a holistic view, one that includes the sustainability practices of suppliers, and perhaps extends to the entire supply chain. This scrutiny could expose potential gaps between stated sustainability claims and actual practices, thereby enabling a more accurate evaluation of environmental performance signals.

5.8 The Complexity in Achieving Transparency Throughout the Supply Chain

Achieving transparency throughout the supply chain is perceived as a daunting and complex challenge, as revealed by the study participants. While transparency is perceived as desirable and as a significant contributor to the credibility of sustainability claims, its realization is beset by practical hurdles. These include the multiplicity of actors involved, and differences in data management practices across the supply chain again pointing towards the challenge of coordination between supply chain actors (Yang et al., 2018).

In light of these challenges, integrating ECMS into enterprise resource planning (ERP) systems in every department of a company has been proposed as a potential solution by interviewees and by the reviewed literature (Seidel et al., 2014). ERP systems can provide a comprehensive overview of a company's operations and facilitate the consolidation of data which is an often-overlooked obstacle according to Hasan, Smith and Finnegan (2017). The perceptions of participants view such integrations as enablers of crucial insights that can enable more sustainable practices. Moreover, the integration of these systems across departments can promote a higher degree of transparency, allowing for a better understanding of the overall sustainability performance of the company.

However, the effectiveness of ERP systems in creating transparency is limited by the sustainability practices of the company's suppliers and their suppliers in turn. While a company might have comprehensive control over its internal processes and data through ERP systems, the same level of control and transparency might not extend to its suppliers. Therefore, a company's sustainability performance, as reflected through the lens of an ERP system, might still be compromised by unsustainable practices within its supply chain.

When considering the financial stakeholders' perspective, the complexity and resource requirements involved in implementing comprehensive ERP systems and achieving total supply chain transparency undoubtedly exert some influence on financing decisions. It is worth scrutinizing whether the potential risk associated with a company's suppliers' sustainability practices might deter financial stakeholders from financing or if they, instead, pay more attention to the company's own environmental performance. However, the findings imply that the stronger the environmental orientation, the more likely the financial stakeholder is more wary of threats to the credibility of sustainability data.

Overall, this discussion underscores the intricacies of achieving supply chain transparency and the subsequent implications for financial stakeholders' investment decisions. While potential solutions like ERP systems offer some degree of promise, they must be considered within the broader context of a complex and interconnected supply chain.

5.9 Transformative Green IS Initiatives: Aiming for Eco-Effectiveness

A completely different class of green IS initiatives belong to the transformative category. While ECMS serve as crucial diagnostic tools in identifying and monitoring environmental issues, transformative initiatives extend beyond problem identification and foster eco-effectiveness to generate a positive environmental impact.

Several interviewees stressed the need for innovative green IS initiatives to move beyond eco-efficiency and informational capabilities and generate a positive impact in a financially viable way. With increasing pressure from legislators, consumers and growing market opportunities for environmentally sustainable business, such transformative green IS initiatives become a way of future-proofing the organisation.

Although several participants tout the benefits of transformative green IS initiatives, they also understand financial stakeholders objecting to the inherent risks of such initiatives. As with any radically innovative digital technology, these transformative green IS initiatives are not without risks (Park, Pavlou & Saraf, 2020). Apart from the technical risk embedded in such innovative initiatives, these business models run an elevated risk of failing to sustain themselves economically and often suffer from unclear business value. Therefore, the importance of environmental orientation in financial decision-making is relevant here as well. The data suggest that financial stakeholders with a strong environmental orientation hold more positive interpretations of such initiatives and are more willing to sacrifice financial performance for a positive environmental impact. The influence of environmental orientation on financial interpretations of transformative green IS initiatives points towards the concept of calibration being relevant here as well, and not only for ECMS initiatives (Connelly et al., 2011).

6 Conclusions and Limitations

In conclusion, this thesis investigates the perceptions of financial stakeholders regarding the risks and benefits of green IS initiatives, aiming to identify the factors shaping these perceptions. Our findings confirm the inherent complexity of green IS initiatives, as they differ from traditional, non-green IS initiatives by their long-term, non-financial, and multidimensional benefits. It becomes clear that financial stakeholders acknowledge these complexities but continue to strive for quantitative and verifiable evidence to support financial decision-making.

The study highlights the importance of verifiable environmental sustainability data through ECMS initiatives, which brings along benefits such as better stakeholder management, risk reduction, and enhanced control over processes and environmental impact. At the same time, financial stakeholders point out significant challenges regarding data quality, data consolidation, and the lack of inter-organisational standardization.

When it comes to transformative green IS initiatives, the results demonstrate the presence of heterogeneous risk perceptions among financial stakeholders. While transformative initiatives pose substantial risks and challenges, there is an emerging acceptance towards these risks, particularly among those who value the environmental impact of such initiatives.

Furthermore, it was noted that there may be a discrepancy between a financial stakeholder's declared commitment to sustainability and their actual investment decisions. The decision-making process extends beyond the investor's environmental orientation, encompassing factors like risk tolerance, the availability of reliable sustainability data, and the investor's confidence in company management practices.

Despite the current challenges, an increasing number of firms are likely to adopt green IS initiatives, driven in part by regulatory requirements and the growing consumer and investor demand for sustainable practices.

This research contributes to the current understanding of the dynamics of sustainable investment and offers valuable insights for organisations seeking to align their green IS initiatives with financial stakeholder perceptions. By addressing the need for verifiable data, standardization, and acknowledging the complexities of transformative green IS initiatives, organisations can facilitate a more informed and confident investment decision-making process, driving them towards a greener future.

Our research advances the existing body of knowledge on green IS initiatives in two key ways. First, it provides an in-depth, qualitative view that enriches the understanding of how financial stakeholders perceive these initiatives. Second, our study delves deeper into the roles that verifiable data and standardization play in green IS initiatives, and these issues have a substantial influence on the perceptions of financial stakeholders. Thus, this study broadens the understanding of these elements within the context of green IS initiatives.

6.1 Limitations

In examining the financial stakeholders' perspectives on green IS initiatives, this study acknowledges several restrictions that may limit the comprehensive understanding of the topic.

Firstly, our study's focus on the Nordic region's financial stakeholders, while a strategic choice due to the region's commitment to sustainability, could potentially limit the transferability of the findings. Given the potential cultural, regulatory, and economic differences, the perceptions of stakeholders in other regions may differ significantly.

Secondly, our exclusive use of qualitative methodology, while offering rich, in-depth insights, limits the statistical generalizability of our findings. A mixed-method approach, incorporating quantitative data from a larger cohort of financial stakeholder investors, could potentially offer a more robust comparison and measurement of stakeholder agreement.

Finally, a limitation lies in our study's lack of data triangulation. Triangulating interview data with actual investment decisions to assess whether there is a match between stated attitudes and actual behaviors. This could provide insights into whether financial stakeholders follow through on their expressed commitments to sustainability in their investment practices.

Despite these limitations, the study contributes significantly to the relatively nascent field of green IS initiatives from the financial stakeholders' viewpoint in the Nordic region and encourages future research to further investigate and address these limitations.

7 Future Research

Further research could delve deeper into how different types of financial stakeholders interpret and act upon the environmental sustainability data provided by ECMS and transformative green IS initiatives. This approach could be complemented by sector-specific studies, since exploring financial perceptions of green IS initiatives within specific industries could be valuable. Different sectors may face unique challenges and opportunities in their green IS initiatives, and understanding these nuances could further enrich the understanding of financial stakeholder perceptions of green IS initiatives.

Moreover, examining how green IS initiatives can be standardized to improve comparability across companies could also provide valuable insights.

Finally, given the dynamic nature of green IS initiatives, longitudinal studies could be undertaken to understand how financial stakeholder perceptions evolve over time. This would be particularly valuable as green technologies continue to advance and as the regulatory environment changes.

Appendix 1: Coding Glossary

The provided table serves as a dictionary or reference guide for the abbreviations of qualitative codes developed during a research project. These codes represent key themes, ideas, or concepts identified during the analysis of interview data. They were crafted to provide a succinct reference to more complex ideas, allowing for easier categorization, organisation, and interpretation of the data.

Abbreviation	Full Form
ACCP	Acknowledgment of Challenges and Commitment to Progress
BMTF	Business Model Transition Fear
BTDA	Bottom-up vs Top-down Approaches
CASM	Confusion About Sustainability Metrics
CCU	Climate Change Urgency
CEIR	Challenges in ESG Compliance and Investment Returns
CFDR	Concern about Carbon Footprint Data Reliability
CM	Company Maturity
CorpSustReality	Corporate Sustainability Reality Check
DAV	Data Accuracy and Validation
DBI	Diverse Business Impact
DCREE	Desire for Corporate Recognition in Environmental Efforts
DSCFD	Dependency on Suppliers for Carbon Footprint Data
DS	Difficulty in Standardization
DTV	Data Trust and Validation
EFS	Expectation of Future Solutions
EFT	Environmental and Financial Trade-off
ERP-CFM	Role of ERP Systems in Carbon Footprint Monitoring
ESI	ERP Systems Importance
FC	Fairness Concerns

GC	Greenwashing Concerns
GBS	Green-Business Synergy
GreenInvest	Green and Sustainable Business Investment
GS	Generational Shift
GTC	Green Transition Commitment
IAR	Importance of Accurate Reporting
IA	Investment Attraction
ICL	Importance of Common Language
IMT	Importance of Measuring Transition
ISFID	Integration of Sustainability Factors in Investment Decisions
LDESG	Current Limitations in Detailed ESG Reporting
LGS	Local vs Global Sustainability
LongIT	Long-standing IT background
NGS	Need for Guidance in Sustainability
PerSust	Perception of Sustainability
RCI	Regulatory and Consumer Impact
RFIGT	Role of Financial Institutions in Green Transformation
RMCR	Risk Management and Climate Risk
SLD	Sustainability in Lending Decisions
SA	Standardization Advocacy
SC	Shareholder Conservatism
SF	Simplification and Focus
SMCA	Sustainability Metrics in Credit Approval
SRES	Shareholder Return vs Environmental Sustainability
SSC	Social Sustainability Concerns
TranspRegComp	Transparency and Regulatory Compliance

VCU	Value Chain Understanding
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Appendix 2: Interview With P1

Line	Person	Content	Code
1	Valde-mar	Um. OK, now that's up and running. And, so... First off, we're a bit more curious about your background specifically. So... So, Participant 1, if you could please tell us a bit more about your background and your involvement in the field of sustainability?	-
2	P1	Yeah. I started working in sustainability back in [redacted] at a small consultancy. That didn't last very long. It went bust after [redacted] months. There was a bit of a rough start, but after that I... I moved into finance and started at [redacted] as an ESG analyst in the sustainable investment team there. So I was there as an analyst... there for... for five years doing things like active ownership activities, or having dialogues with, with companies around controversial issues doing sector analyses on ESG. And also, um, following up the exclusion policy that [redacted] had and has on, yeah, things like anti corruption and human rights abuses, environmental accidents, those sorts of things. So... So, that's, that was the job basically. Um, then I had a year where I was head of sustainability for the... for the group. So that was more moving to a more reporting role, representation role. And then back to the last 5 1/2 years, I was there, I, I led the team on sustainable investments. So I was leading the team of seven analysts, so the same team I started in basically. And then the, the... the longer I was there, the more, the more moved from exclusions to product development, designing fossil free funds, designing sustainability funds, that sort of thing. So it became more, if you like, uh, positive and probably a little bit more commercially focused as, as time went on.	-
3	Valde-mar	OK. I see. That's interesting. So it... it went from more of an exclusion perspective in terms of including certain and excluding certain assets and funds to more of a positive impact kind of focus...	-
4	P1	*Participant 1 nods.* Yeah. Yeah.	-

5	Valde-mar	OK, that's interesting. And this kind of brings me to the next questions, the next, more overarching questions of our... our interview, because you mentioned about... you mentioned something about preventing environmental accidents, you also mentioned a bit about reporting and a bit about product development. So these are all different aspects of uh... sustainable development and environmental sustainability of business. But just a broad question - so what, what's your perception of environmental sustain... sustainability?	-
6	P1	How would I define it?	-
7	Valde-mar	Yeah, yeah.	-
8	P1	Yeah, I mean... I think in the field of environmental sustainability that climate gets a big place at the moment, so that's natural in, in... in one way it's... you know, we're in the middle of a climate crisis.	Environmental sustainability
9	P1	So it's... in a way it's natural, but it sort of takes up so much room. At the same time, it's like... from our point of view, it's important to not be too climate... focused and... and realize it's actually one part of a... of a much broader set of issues	Non-climate environmental issues
10	P1	So it's... it's been really interesting and good to see that issues like biodiversity have got a lot more interest over the last few years and	Biodiversity
11	P1	but issues also like you know water quality you know the quality of oceans and ocean life and those sorts of issues are... are I think coming up a lot better and and I think it's important.	Aquatic life
12	P1	And it's... it's also, you know, been more part of the discussions, the... the connections between these sorts of things. You know, if you... if you take out the Amazon rainforest, you're both, you know, contributing significantly to emissions, but you're also reducing the ability of the earth to or the... of nature to absorb and store carbon. So you know it's... these things sort of are very, very closely interconnected, and I think that sort of perspective is... is important for us to stress.	Interconnect-edness

13	Valde-mar	Yeah, certainly. Yeah, there... there's... there's no no issue that's completely isolated that way. So that's that's interesting as well for... for a business point of view as well because oftentimes there are... There are often these views that “ok, sustainability and... and organizational performance or financial performance, sometimes they make part of a trade-off relationship,” where... where one might, you know, benefit initially... An initiative might benefit one thing more than the other.	-
14	P1	Hmm.	-
15	Valde-mar	So how would you approach such... such a type of situation?	-
16	P1	Hmm, it's... I mean, you know, we're sort of opening a big can of worms here in terms of like the relationship between environment and sustainability and returns and financial... financial performance.	Trade-offs
17	P1	Like on the one hand, there's a... there's an increasing body of literature that shows, for example, that investment in green funds, sustainable funds, um... uh is... is something that you know that can give you a premium in the... in the... in the market.	Synergies, weak sustainability, research
18	P1	But on the other hand, that body of research isn't... is not uncontroversial.	Weak sustainability, research
19	P1	I mean, there's... if you... if you think about companies doing sustainable investments and there's... there's no sort of hard and fast rule that because you do something green it's going to save you money or because you do something green, you're going to get more customers.	Weak sustainability
20	P1	I mean you might but if there's no sort of there's no direct relationship in every case. So sometimes it could and sometimes it's just more expensive.	Weak sustainability
21	P1	But it doesn't necessarily mean you shouldn't do it,	Trade-offs, strong sustainability
22	P1	but you know it's there, there are a number of things that companies could do positively that don't	Trade-offs

		necessarily have a direct effect on their financial performance.	
23	P1	So it's a, it's a... it's a mixed bag and it's, it's, it's too hard to say, well, yeah, "yes, it's a positive effect" or... or "no it's not".	Trade-offs
24	P1	But of course, me working in the financial industry, I would say that the... by and large we see more advantages for companies of doing this than costs, right?	Synergies
25	P1	So the cost might be immediate, the cost might be significant in terms of investment,	Trade-offs, short-term costs
26	P1	but you know the long term benefits of reducing their carbon emissions, having greener products that are more attractive on the market, those sorts of things,	Synergies, long-term benefits
27	P1	attracting younger people who are more interested in... in sustainability than you know, people in their 40s, and all these positive effects, uh, are what we sort of talk a lot about and stress.	Types of investors
28	Valdemar	OK, I see. So this increasing, what should you say, uh pressure or development towards environmental sustainability is changing the picture, I guess. And it's also interesting to see how that... you know it... it really depends on the case whether it is a synergistic relationship or if it's a trade-off relationship. So and... and there's no silver bullet obviously as you mentioned. However, um, in terms of performance, environmental performance, uh, where do you think companies are today compared to where they should be?	-
29	P1	Um, that's a good question. I think it varies from... from sector to sector. Uh, there's been, you know, a number of sectors over the course of their high climate emissions have been sort of pressed by, you know, regulators to do much, much more.	Compliance, large emitters
30	P1	So, you know, I mean, you would look at companies like, you know, industrial companies still produce... aluminum producers, plastic producers, you know, actually quite doing quite a lot of things to try to bring down their... their carbon footprint,	Eco-efficiency, manufacturing

31	P1	and not just because they're like the... the nice companies, but because you know, the carbon price is expected to increase and if you do... do these sorts of things then you're going to save costs in the long run.	Synergies
32	P1	So, so, so sectors that have, um, uh, a... yeah, a strong regulatory push are moving faster, I think.	Compliance
33	P1	But whether they're... the question here... to come back to the question: "are they moving fast enough?" Well, they're not moving fast enough. I mean, just look at... at climate, what we need to fulfill the goals of the Paris agreement is a 7 % year on year reduction in climate emissions from the economy as a whole, to... to get there, right? and that's the... that will give us a 50% decrease in 2020-2030. What we're seeing is a 1 to 2, 3 % increase year on year. So we're... we're almost 10% away from where we need to be. If you, if you're looking from a scientific perspective, you know, limiting climate change to under 2 degrees. So are they moving fast enough? No. Are they moving? Yes. But it's all, it's all a matter of tempo and whether it's going fast enough.	Strong sustainability
34	Valdemar	Yeah. OK, I see. Yeah. Yeah. So this... this urgency also makes this next question, I guess, relevant because a lot of... a lot of firms are using green information systems to improve environmental performance. For example, they... they use information systems to monitor and report greenhouse gas emissions in a systematic way and in an accurate way. So, like, how do you view the benefits of doing this in this entire picture that you mentioned earlier?	-
35	P1	Yeah, I think it's absolutely central,	Synergies
36	P1	the being able to automatically and quantitatively measure and report on, on emissions, on waste, on, you know, uh, water pollution. All, all sorts of... these sorts of things.	Synergies, informate, automate
37	P1	Um, if you can get uh, data systems to... to do that in either in real time or in, you know, in... in... in a way that is... is quality-assured then that's, that's fantastic.	Informate, verifiability
38	P1	Because what's... what's been the problem, uh, up until now is... is just that. ESG data, sustainability	Data quality

		data has been, you know, self reported, poor quality and not put into systems,	
39	P1	or not, you know... not calculated according to standards that are internationally accepted.	Standards and certifications
40	P1	So if you were, I mean if you... if you were to give me a company that reports all this data according to international standards sort of like in real time that the investors can see you know, performance, you know, month to month, if you like, or quarter to quarter, then that's fantastic. That's, that's really what we need.	Standards and certifications, data quality
41	Valdemar	OK. Interesting to hear. Yeah, because this also really points to the... the issue of data quality which is an often overlooked topic in research as well where the data collection practices, data consolidation practices, etc... they're kind of overlooked in the... in the actual implications of such initiatives. And they're also part of the risk profile of doing such initiatives. Because a lot of research points to a lot of work needing to be done in order to successfully implement such initiatives that monitor and report greenhouse gas emissions in a quality-assured way and in a verifiable way, etcetera.	-
42	P1	Yeah.	-
43	Valdemar	There are many issues such as data consolidation, data collection practices, etcetera. But what... What risks do you see in such initiatives, uh, both, both in that department and otherwise?	-
44	P1	What? What do you mean by initiatives like initiatives that the company is going to do themselves or that...	-
45	Valdemar	Yeah, they... that they do themselves, where they do these environmental monitoring systems.	-
46	P1	Um, I think that probably, the... the risks are that you, um, I mean if you don't have a standardized calculation methodology to start with, then, then you may get sort of poor quality data anyway.	Standards and certifications, data quality
47	P1	If you don't have, you know a similar way of entering the data into systems, and then that could be of course a problem.	Data quality

48	P1	But I, I mean I see much, much more advantages with doing it than disadvantages.	Synergies
49	P1	I mean, if you, if you look at what's going to be expected of companies in the, in the CSRD reporting system, and they're... they're looking for data points, they're looking for data that can be verified and will be verified, you know what I mean? So... So I don't think really companies have any choice to improve their systems and to put these systems into place because it's... it's just going to be expected through the regulatory reporting standards that they're subject to.	Data quality
50	P1	So um so yes, I mean there are risks in terms of you know it's... it's a hard thing to do, and... and you know why hasn't this been done before? Probably, yeah, because it is a hard thing to do. You know, you don't have	Trade-offs
51	P1	I'm not sure whether a lot of companies have the... have the... the sensors or the... or the ability to pick up the environmental information that they're... that they're... that are being asked of them, you know? Do they... Do they actually have systems to, you know weigh and sort and and understand the waste they have? Or... or does it all just sort of... yeah, um	Green IS capital, sensors
52	Valdemar	Hmm. *Valdemar nods*	-
53	P1	Yeah, I mean, you see what I'm... what I'm getting at?	-
54	P1	I think maybe the problem is actually right down at the, at the... at the garbage rooms or the output to the lake or whatever, wherever you are looking to get data from.	Sensors
55	P1	Do you have sensors or do you have automatic systems to pick up the data that you're looking for? Is that expensive? Is it going to... what are the costs going to be if you put that on every, every garbage room and every pipeline that goes out to the sea or you know what I mean? It's... it's...	Short-term costs, change impact, sensors
56	Valdemar	Yeah, yeah.	-

57	P1	You know, if you're looking at the size of some of the companies that... that we're talking about here, then it's, you know, it's a huge job. Enormous job.	Change impact, company size
58	Valdemar	Yeah, absolutely. And I think it's also, as you mentioned, a lot of questions about sensors, which is becoming a bit of a hot topic actually in research as well with, you know, increasing amounts of sensors for energy consumption, smart grids and also for resource consumption.	-
59	P1	*Participant 1 nods.* Hmm.	-
60	Valdemar	Uhm, but in terms of the investor perspective when... when evaluating investments or portfolios that are exposed to these initiatives that tackle this topic with information systems or, or technology such as sensors and environmental reporting, are there any factors that influence the decisions in terms of investment?	-
61	P1	Uh, any factors related to what? What systems companies choose?	-
62	Valdemar	Yes. For example, yeah.	-
63	P1	Um. I think, I think... what I think... investors are at one step up in the... in the chain if you like. Like, I don't think they necessarily care what sort of sensor you use or what sort of system you use	High-level information
64	P1	as long as you can... as long as the data is verified like... like they don't necessarily have time to go down and... ok, investigate how things are done.	Verifiability
65	P1	As long as it's, you know, certified or verified, or they have some sort of external... that companies use, some sort of external sort of auditor, or, or way of verifying that what they're doing is, is, you know, credible.	Signal credibility, extrinsic signals
66	P1	Then that's what... that's what investors are looking for. So they're looking, they're basically looking for the certification or the credibility. You know, where it comes from, it doesn't you know... what sort of system underlies - I don't think that that's fussed about.	Signal credibility, extrinsic signals

67	Valde-mar	OK, OK. So it's... it's not so much on the... on the actual detail perspective but more on the overarching where... whether it's verifiable or not and who does this certifying etcetera.	-
68	P1	Yeah, exactly, because I mean if you're looking at investors they've at a minimum they've got say 60 to 100 companies in a portfolio or a fund to look at.	High-level information
69	P1	Environmental aspects are only one part of maybe 70 aspects that they look at in a, in a company,	Weak sustainability
70	P1	you know all the other financial things, the market competitive situation, you know.	Returns
71	P1	So it's only one thing out of a lot of things and it's one company out of a lot of companies.	High-level information
72	P1	So you know they, they need... the data that they're consuming needs to be sort of, uh, chewed up and spat out and, and... and processed for them already. They're not really looking for raw data, they're looking for, you know, more sort of top line data.	High-level information
73	Valde-mar	OK. OK. So the, the cleaned and refined data that... that gives these high level insights.	-
74	P1	*Participant 1 nods* Yeah, exactly.	-
75	Valde-mar	OK, Yep, Yep. Because I... I can imagine there's a lot of, a lot of detailed data on many different levels. But again, the... the potential of these reporting systems, I guess they can aggregate all this data and create these, these high-level insights. Um and that in... in and of its own is useful for investors evaluating their... their assets and their portfolios as, as you mentioned earlier. That, that was also really interesting. And also in terms of showing a verifiable way of committing to reporting about environmental sustainability. I think that's also... However these values they're they're not necessarily of a financial nature like many investment methods work with net present value methods or discounted cash flow techniques, but addressing this type of, uh, evaluation, uh, whether these non-financial aspects included... that, that might become more difficult with these traditional techniques. How... how to approach this challenge?	-

76	P1	If you ask the question again, I'm not really sure I understood what you mean.	-
77	Valdemar	Uh yeah, well um... Well, A lot of these benefits that come from green information systems initiatives such as implementing a... an environmental sustainability monitoring system with sensors and reporting capabilities etc. And they have many benefits that are non-financial, so that makes it difficult to use discounted cash flow techniques or net present value techniques - they're usually used. So how to approach this challenge?	-
78	P1	Yeah, That's a good question. Because, I mean, as you said, a lot of the benefits are non-financial benefits	Non-financial benefits
79	P1	and a lot of the benefits may be... are also reduction of risk.	Risk reduction
80	P1	Because. I mean, if you... if you think of having control... environmental management systems based on sensors, it gives you much, much greater control over, over what you're putting out into the atmosphere or into the water, or into wherever you're, you're operating.	Informate, control
81	P1	So I think it reduces the risk quite substantially of, for example accidents happening or leakages happening or... or if,	Risk reduction
82	P1	if things do happen then you you, you now suddenly already realize what's going on you know a couple of seconds after it started happening rather than a day or or five hours, where you know the consequences might be much much larger.	Informate, control
83	P1	So you know, I think the risk reduction perspective is, is... is important. So if you look at it from a risk reduction perspective... and that could also have financial implications as well.	Risk reduction
84	P1	You know the, the level of fines or the level of... of clean up that has to be done, you know it's... It's probably harder to quantify, but it's uh, I think that sort of risk reduction perspective is probably the best way, the best advantage to look at.	Risk reduction, quantitative appraisal

85	Valde-mar	OK, I see, I see. So risk reduction is actually a pretty significant factor for reducing accident risks or avoiding these fines and generally being proactive instead of... uh, you know, realizing it a day or so after the accident happens. However, um, are there... Are there any other, um, benefits you see from these initiatives that are hard to quantify? Uh, I mean, we... We talked about reducing risks but other sustainability related factors that might be difficult to quantify?	-
86	P1	Um. I think... I mean how, how do you quantify just being a cleaner company? Or, or a company that just, you know, operates greener.	Non-financial benefits
87	P1	You can... you can quantify that, I suppose in, in the... in the data that you get in, and then you can sort of um make that... make that available in, in annual reports and quarterly reports and	Quantitative appraisal
88	P1	make it obvious to investors that you know you're, you're better positioned than other companies.	Signal credibility, informate
89	P1	So, so you know that that could be, I mean... there could be financial, commercial effects that are positive as well.	Returns
90	P1	But it could also be local community effects as well. Like, if you're... if local communities understand that... that whatever emissions are happening are being monitored and monitored all the time,	Informate
91	P1	then that gives them a lot more trust, and then yeah.	Non-financial benefits, control
92	P1	So, so that also could reduce risks of conflicts with local... local communities.	Risk reduction
93	Valde-mar	OK. Yeah, that... that's interesting that the stakeholder perspective is also important in terms of environmental sustainability, as it's such a, uh... a global issue as well.	-
94	P1	*Participant 1 nods* Yeah. Ok, I'll give you an, a good... a good example of that. Norsk Hydro, I'm not sure if you remember the accident in Brazil, uh they had... they had a huge aluminum or bauxite, I think,	-

		plant in Brazil. There was a huge, uh, or a once in a 100 year rainfall episode.	
95	P1	So the, the, the whole factory area got flooded and there was a missions that, that went from the factory sort of uncontrolled into the river and uncontrolled into local area.	Risk reduction, eco-equity
96	P1	Now the... they thought that, they were not trying to have... thought that in their impression or opinion was that the, the emissions didn't seriously affect the surroundings neither the river or the, or the people living nearby, but they were unable to sort of document that effectively or, or well enough.	Verifiability, signal credibility
97	P1	The local community was really, really upset and, and, and you know basically blamed the Hydro for all sorts of things. You know, health issues because of this and, and, then it ended up being shut down for six months, not because of the direct environmental effects but because of the local community.	Control, quantitative environmental performance
98	P1	Stakeholders were so concerned that the government stepped in and shut down the plan until improvements were made.	Compliance
99	P1	Now if you're looking at a situation where, "ok Hydro has better control over what's been released," can document that in a much better way, reassure authorities, reassure the local communities, that "OK. It's it's actually quite a minimal risk here." Then you know, you're probably looking at a couple of days shutdown rather than a six month shutdown. So yeah, it's a good example.	Control, informate
100	Valdemar	Yeah. So it's interesting because not only these direct physical accidents they... they they don't have implications... Or they do have implications, but then there's the additional element of... of stakeholders as you mentioned. So that's also an interesting perspective to include, and, and more generally not... not so much for the immediate surroundings of production facilities, but more for, for example consumers in general. And there was this article where they examined, uh... it was from 2017, where they examined announcements of the companies launching sustainable products and services. And after they released this	-

		announcement, their stock dropped quite significantly, especially after they released...	
101	P1	*Participant 1 looks pensive*	-
102	P1	After they released the environmental products?	-
103	Valde-mar	After they announced their commitment to producing, producing them, or pivoting towards them.	-
104	P1	Ok, and the stock price fell on that announcement?	-
105	Valde-mar	Yes.	-
106	P1	OK. Interesting.	-
107	Everyone	*all parties chuckle at this fact*	-
108	Valde-mar	Yeah. Yeah. So it was just an interesting perspective just to... Yeah, because... it's of course... it's obviously very relevant to the immediate surroundings of production facilities and to build trust among investors and the general industry and consumers etcetera. But it's also interesting to see that the immediate effects are neg... negative, while the long term effects, as you mentioned, are also... that there are positive lag effects where, where the returns show after a while.	-
109	P1	Why? Why would the... What's the uh... What's the theory on why that happens? That the... why green products or that sort of announcement would cause a drop in... share price?	-

110	Valde-mar	Yes, that was also quite puzzling for me. But the authors speculated... they, they did a quantitative assessment. So they, they checked what happened with the stock price, but they did not do a qualitative follow up where they investigated why this happened. But they had a theory of... that investors feared that consumers would not be willing to pay a premium for more sustainable products versus the less sustainable products that are cheap.	-
111	P1	That makes sense.	-
112	Valde-mar	Yeah, yeah. So I'm just thinking in terms of, uh, sustainable products and services, because we've talked a lot about... IT-enabled reporting and monitoring, but for sustainable products and services, they might come at a higher price point for consumers. So I'm just thinking in terms of the financial perspective on this. What are your opinions or... how, how do you view this?	-
113	P1	Um. Yeah, I... *short chuckle*	-
114	P1	I, I think, that to be honest, I think investors are probably... or the market's probably right, where you know there doesn't seem to be a very strong preference.	Weak sustainability
115	P1	I mean there, there is a strong preference for green products. But if, if you don't have to have any trade-off in price. You know like, if, if you have like two things on the shelf, they all... but they both cost € 2.50, and one's green, and one's not, then you know, obviously, the green is going to have an effect.	Weak sustainability
116	P1	But if the green's € 3.00 and the other € 2.50 then... Yeah	Unclear value
117	Valde-mar	Yeah.	-
118	P1	Unfortunately, I don't think the majority of people are willing to pay for it.	Strong sustainability
119	Valde-mar	Yeah, I see. But consumer sentiment is also completely external.	-
120	P1	*Participant 1 nods* Hmm.	-

121	Valde-mar	It's... it's out of the, out of the investors' hands, one could say. So that, that would naturally have a consequence I guess.	-
122	P1	*Participant 1 nods affirmatively* Mhmm.	-
123	Valde-mar	OK, I see, I see. Um, so I think uh... these were the interview questions. I think there were a lot of interesting points, especially interesting to hear more about the, the verifiability part of... of reporting mattering so much and and the external certifications. So I'm just on, on a... on a final note, just if you have any examples of you know, the most significant or, or common types of certifications you encounter.	-
124	P1	But what I'd like for... in your perspective, if you're going to follow up on, on that, you know the... the importance of verification,	Verifiability
125	P1	I'd follow up on the Corporate Sustainability Reporting Directive. And the associated European Sustainability Reporting Standards.	Compliance
126	P1	So those two are, I think... are more important in our part of the world than any specific certification because they... The CSRD will... quite significantly increase the number of, of companies having to report on sustainability, give them a standardized reporting framework, but then also require verification on the data that they're reporting.	Informate, compliance
127	P1	And the, the data they're reporting is everything from climate change to water quality and pollution,	Non-climate environmental issues
128	P1	to you know social issues both in the company and in the supply chains.	-
129	P1	So the fact that that reporting standard requires verification in a way that have... that other reporting standards haven't before and... and requires sustainability information to go into management reports and annual reports in a way that it hasn't been before. That's, that's what's going to, erm, be important for companies to consider and, and I think that's like... For, for you when you're looking at, you know, the possible consequences of verification, look at... look at that reporting standard and, and see what it actually requires. I think that's important.	Change impact, compliance, verifiability

130	Valde-mar	OK, yeah, thank you for the advice. Yeah. So it's also interesting because this reminded me of in EU initiative under proposal still but it's... it will significantly increase the, the documentation requirements, and I think... Yeah, it, it might even be the same type of initiative we're referring to	-
131	P1	Yeah.	-
132	Valde-mar	I think... I think so. But if I remember correctly, it's mostly aimed at large corporations, right?	-
133	P1	Yeah. At the moment it is um, but it, it moves successively to smaller and smaller corporations. So that's that's why the number of you know... I think it moves from... like the sustainability reporting standards I think now cover like 10,000 companies by the... by the time this comes in it'll be 50,000 companies so, so you get to smaller and smaller companies, but still listed companies, though, I think. Not, not necessarily privately... privately owned companies.	Compliance

Appendix 3: Interview With P2

Line	Person	Content	Code
1	Valde-mar	Få se... så ja. I alla fall så du har ju redan börjat berätta lite om din bakgrund och så vidare så det är ju jättebra. Så jag kanske, kanske går lite mer in på hållbarhetsämnet som är... kanske lite överämnet för diskussionen just nu. För mycket av arbetet handlar om hållbarhet. Men där vill jag bara fråga dig, alltså hur du ser på miljömässig hållbarhet, alltså “environmental sustainability”, hur skulle du definiera det?	-
2	P2	Jag skulle säga att det finns... att vara miljömässigt hållbart eller bara miljömässig hållbarhet, så det brukar man ju liksom teoretiskt definiera som att liksom inte göra något avtryck på miljön. Men jag tycker att när man pratar om bolag och att identifiera liksom en, en miljömässigt hållbar investering eller ett miljömässigt hållbart bolag, då tycker jag att det finns två definitioner som man kan utgå ifrån och den första är lite inne på samma sak: att ett hållbart bolag	Environmental sustainability
3	P2	Det kan ju naturligtvis vara ett bolag som inte gör något avtryck på varken klimat eller miljö eller natur. Så det skulle jag säga är ett hållbart bolag miljömässigt. Exempelvis ett IT bolag som liksom bara driver sina serverhallar på förnybar energi och inte har något klimatavtryck. Då kan man ju säga att det låter som att det är miljömässigt hållbart.	Eco-efficiency
4	P2	Men en annan definition skulle jag säga är ett... bolag som, vad ska man säga, skapar så mycket nytta som möjligt, även om liksom deras egna verksamhet kanske inte är helt klimatneutral, och det kan ju vara bolag som genom deras tjänster eller produkter gör att andra bolag inom andra sektorer blir mycket mer hållbara.	Eco-effectiveness, eco-equity
5	P2	Man kan ju ta som ett exempel bara... Hybrit är ju ett projekt som håller på att göra fossilfritt stål och även om, om den liksom... Stålet i sig kommer vara fossilfritt, så kanske det är andra saker i den verksamheten som som inte är helt klimatneutralt, men däremot om andra verksamheter, så att säga byggbranschen kan behöva använda det här stålet, då kan ju det skapa ett otroligt mycket lägre klimatavtryck i en annan bransch. Även då det är inte är helt klimatneutralt, själva bolaget själv. Så att där skulle jag säga att det är två olika:	Manufacturing, eco-equity

		antingen att vara klimatneutral eller att göra så stor nytta som möjligt.	
6	Valde-mar	OK, ja, intressant. Så det det pekar ju lite på på den här diskussionen mellan om man gör hållbarhet som en intern, liksom... alltså ett internt uppdrag där man ska minimera sitt avtryck eller om det blir lite mer externt där man liksom har lite större ambitioner och går efter hela industrier eller andra företags klimatavtryck på något sätt. Eller om jag uppfattar det korrekt?	-
7	P2	Exakt.	-
8	Valde-mar	Ja, OK.	-
9	P2	Ja, men precis. Så att det kanske inte är klimatavtrycket i den egna verksamheten som är liksom det stora avtrycket, utan det kan ju vara genom produkterna eller så som man säljer.	Eco-equity
10	Valde-mar	OK, perfekt. Men där funderar jag ju också lite på en kanske lite knivig fråga i och med att ofta så är... Så, så framställs miljö alltså miljömässigt..., alltså miljöprestanda och hållbarhet som en win-win-situation med liksom ekonomi... att "ja, men det kan löna sig att vara hållbar och miljövänlig." Men ibland ingår de i ett kompromissförhållande. Där är det lite... lite nollsummespel, där det ena kanske gynnas medan det andra kanske stjälps lite och vice versa. Alltså hur... Hur prioriterar man i en sådan situation tänker du?	-
11	P2	Ja, alltså, jag skulle säga att det... beror ganska mycket på vad för målsättningar en fond har, för att liksom fondens uppdrag är ju ändå att uppfylla vad man lovat till aktieägarna som liksom äger fonden.	Types of investors
12	P2	Eller om det är ett bolag så att, låt säga att du är ett bolag som har lovat, eller en fond som har lovat aktieägarna så hög avkastning som möjligt. Då kanske det här med hållbarhet är sekundärt. Att liksom då spelar det ingen roll. Då spelar håll... hållbarhetskriterierna spelar liksom ingen roll i sig för att välja in ett bolag i portföljen.	Weak sustainability

13	P2	Eller om det är ett bolag så att, låt säga att du är ett bolag som har lovat, eller en fond som har lovat aktieägarna så hög avkastning som möjligt. Då kanske det här med hållbarhet är sekundärt. Att liksom då spelar det ingen roll. Då spelar håll-... hållbarhetskriterierna spelar liksom ingen roll i sig för att välja in ett bolag i portföljen. Sen kan det ju ändå spela roll liksom det kan ju vara win-win som vi pratade om att det är ett bolag som man ser kan vinna på den här, liksom på den omställningen som vi går igenom, och då kan det ju vara både ekonomiskt gynnsamt och hållbart.	Weak sustainability, synergies
14	P2	Men många... de flesta fonder skulle jag säga i Sverige idag - de har ju liksom en, en kombination där man kanske inte har ett särskilt hållbarhetsmål med portföljen, men däremot så har man exkluderingar. Så låt säga att en fond har fritt inom vilka liksom bolag eller sektorer de kan investera mellan, men de har en exkludering att de inte investerar någonting i olja och gas eller inte investerar någonting i alkohol och tobak. Liksom, det finns lite olika exkluderingar och låt säga att en fond har en exkludering mot olja och gas. Då kan ju det vara... Det kan ju låta som en ganska liten... litet commitment liksom.	Weak sustainability, exclusion
15	P2	Det är inte så att det här är världens hållbaraste fond, men där kan man ju säga att det inte finns någon kompromiss. De har sagt då att oavsett finansiell prestation på bolag inom den här sektorn, "så kommer vi inte att investera där,"	Weak sustainability, strong sustainability
16	P2	så att jag skulle säga att även om man inte har så där supertvingande hållbarhets- liksom krav så... så görs det kompromisser där man väljer hållbarhet framför finansiell finansiell utveckling för att man jobbar mycket med exkluderingar.	Trade-offs
17	P2	Men i många fall går det ju att vara båda. Och där ser vi ju liksom flera fonder som har både hållbarhetsriktlinjer och exkluderingar.	Exclusion, inclusion
18	Valdemar	OK, ja absolut, alltså det... Det är ju det är ju både och alltså... I vissa... Det beror ju mycket på vilket fall man pratar om och att... om vilka företag och vilka branscher och så vidare...	-
19	P2	Mhmm.	-

20	Valde- mar	Och här hörde jag också... hörde jag dig nämna lite exklusionspolitiker, alltså i samband med att styra fonder och så vidare... men vissa börjar också prata om... en annan intervjuperson pratade lite om inklusionsstrategier, att de särskilt riktar sig mot bolag och inkluderar dem i lite större grad, alltså i och med att de kanske lite mer riktar sig lite mer in på hållbarhet. Och vissa arbetar till och med med aktivt ägande. De försöker att få lite inflytande på bolagsstämmor och så vidare för att påverka dem i en lite mer hållbar riktning. Men det är inte så stort än? Eller är det lite... mycket mer fokus på exklusionskriterier just nu eller? Eller hur ser det ut?	-
21	P2	Jag skulle säga att liksom nästan alla fonder har åtminstone någon exkludering, så att på så sätt kan man ju säga att exkluderingen är den största strategin som man använder.	Exclusion
22	P2	Men precis som du säger så blir det vanligare och vanligare att man använder andra strategier i kombination med exkludering, och där är ju liksom inkludering ett strategiskt... eller att det är liksom tematiska portföljer som riktar in sig på ett visst hållbarhetstema.	Types of investors, strong sustainability, inclusion
23	P2	Det blir mycket vanligare och nu ska vi inte gå in alltför mycket på... på detalj om, om det här. Men det finns ett nytt regelverk som precis har börjat gälla som heter SFDR, och i kort så handlar det om att fonder måste klassificera sig inom olika kategorier beroende på vissa hållbarhetskriterier. Och då bland annat, så artikel 9 som det kallas, det är den klassificeringen som är högst när det gäller hållbarhetskriterier, och för att få vara klassificerad som det som fond så måste man ha 100 % hållbara investeringar i fonden, och där kan man ju se att det är betydligt färre fonder idag.	Compliance
24	P2	Jag har inte en exakt liksom procentuell siffra på det, men låt säga i, inom EU kanske det är 2-3 % av fonderna som är artikel 9, men där är det ju 100 % hållbara investeringar. Så där kan... även om man fortfarande försöker få avkastning till, till sina aktieägare så går ju då hållbarhet före allt annat på, på alla bolag som man väljer in.	Compliance, strong sustainability

25	P2	Och sen så artikel 8, det är nästa klassificering, och där handlar det om att man måste åtminstone liksom ha som mål med följden att man ska främja hållbarhet. Fast alla bolag i portföljen behöver inte vara hållbara, och där pratar vi om att det... jag tror nästan att det är över 50 % av alla fonder inom EU som klassificerar sig inom den här artikel 8, så att uppenbarligen så är det väldigt, väldigt vanligt idag att man som fond har också liksom ytterligare mål om att ha hållbarhet som kriterier i sin investeringsstrategi.	Compliance, weak sustainability
26	P2	Så att det... där håller jag helt med. Det blir allt vanligare att man jobbar med mer än bara exkluderingar.	Inclusion
27	Valdemar	Okej, ja, ja. Men det... Då hänger jag med. Men det är också spännande att... att höra liksom praktiken... alltså i detta liksom... att det, det händer ju nya utvecklingar hela tiden. SFDR-lagstiftningen särskilt ja. Så här funderar jag lite på att du... du nämnde redan lite status på vart fonder och aktiebolag befinner sig just nu, alltså i samband med hållbarhet. Men vart tycker du att de befinner sig just nu? På... på en hållbarhetsskala på något sätt jämfört med vart de kanske borde vara enligt dig.	-
28	P2	Ja, där är det ju återigen såklart väldigt olika beroende på vilka bolag man pratar om och det kan också se väldigt olika ut inom olika branscher. Men jag skulle säga att de bolagen som vi tittar på, där är det allt, allt vanligare att man har... alltså att man nu har satt konkreta och liksom tidsmässiga hållbarhetsmål.	Quantitative environmental performance, strong sustainability, environmental goals
29	P2	Det vill säga att till 2030 så ska vi ha minskat utsläppen med så här mycket eller till 2050 ska vi vara klimatneutrala. Och jag skulle vilja tippa på att det kanske är 70 % av bolagen som vi täcker som har satt något sådant mål, och de flesta satte målen liksom under 2019, 2020, 2021 och sen så 2022, så det är ju under de senaste åren som bolagen ens har börjat sätta målsättningar för deras klimatarbete.	Quantitative environmental performance
30	P2	Och då så... då kan man ju liksom påstå att de precis har börjat nästan, för att om man inte har någon målsättning då är det svårt att konkretisera vad det är man har gjort och hur långt man har kommit på vägen.	Environmental goals

31	P2	Så på så sätt kan man väl säga att de flesta bolag är i början av sitt klimatarbete, och det pekar ju också forskningen på, som, som visar att utsläppen sjunker inte så snabbt som de skulle behövt göra om vi liksom ska nå Parisavtalets klimatmål eller sådana saker.	Research, strong sustainability
32	P2	Så att jag skulle säga att de flesta bolag är precis i början av sitt klimatarbete, men liksom med positiva bemärkelsen att många har ju satt... satt upp väldigt tydliga liksom planer.	Environmental goals
33	P2	För första steget är att sätta målet, nästa steg är ju hur man ska nå dit, och det tror jag att det är flera bolag som sitter och funderar på nu.	Change impact
34	P2	Sen är det också lite sådär under året som har varit... Det har varit ett väldigt... ett år där det hänt jättemycket. Vi hade, eller vi har kriget i Ukraina. Vi har haft energikris, och nu har vi höga räntor, och då finns det ju absolut en risk att hållbarhetsarbetet liksom kanske inte sätts på paus, men att det är andra saker som prioriteras före, och det är liksom helt naturligt för det måste ju bolagen göra i vissa fall för att överleva den här tuffa perioden.	Weak sustainability
35	Valdemar	OK, ja, absolut. Så konjunktur spelar en jättestor roll i, i samband med hållbarhet, särskilt med lågkonjunkturer. Där kanske det blir lite mer pressat och att det inte finns lika mycket utrymme så det... Det förstår jag absolut men, men om vi rör oss...	-
36	P2	Precis.	-
37	Valdemar	... lite mot gröna informationssystem är alltså det... Det är en ganska teoretisk term, har vi upptäckt. Det är inte en term som används mycket i praktiken. Men en kort förklaring av gröna informationssystem... Det är ju mer eller mindre informationssystem, alltså digitala lösningar som används för att förbättra företags miljöprestanda. Både, både internt och externt, så det kan till exempel vara system som automatiskt monitorerar, övervakar och rapporterar utsläpp av växthusgaser till exempel och sen så koldioxid... alltså kilo koldioxidekvivalenter. Eller något i den stilen. Så jag, jag vet inte hur många sådana, liksom digitala lösningar du har... har bekantskap med. Men, men till exempel såna här monitoreringslösningar. Hur... hur ser du på fördelarna med detta? Alltså ur ett alltså investerarperspektiv, tänker du?	-

38	P2	Jo, men jag skulle säga att det här absolut ses som en fördel om man som ett företag har implementerat sådana processer,	Synergies
39	P2	för att dels... så kan det vara positivt för lite mer det vi pratade om tidigare, liksom att sätta mål. Det är en sak,	Environmental goals
40	P2	Det är en sak, men någonting som är superviktigt både för att kunna sätta mål om klimatpåverkan och för att liksom veta hur långt man är på vägen, det är ju att kunna ska ta fram KPI:er och kunna identifiera, liksom datamässigt vart man befinner sig nu, både när det gäller utsläpp eller energieffektivitet eller vattenanvändning. Det finns ju hur mycket som helst där.	Informate, synergies
41	P2	Så att på så sätt så är det ju väldigt viktigt som företag att man har sådana processer på plats, och desto mer effektiva de är desto bättre är det.	Automate, informate
42	P2	Också för att nu pratar man mycket om att bolag kommer behöva rapportera mer och mer hållbarhetsdata,	Compliance
43	P2	och då skulle ett sådant här informationssystem ni pratar om underlätta jättemycket för bolagen i att ta fram den här datan, för det är också väldigt resurskrävande. Så att om vi jämfört såna här system versus en person eller ett helt team som sitter och tar fram den här datan för hand, då är ju såklart informationssystem ett mycket bättre tillvägagångssätt, och det kan vara bra för många saker, för inte bara att det kan vara liksom resurseffektivt när det kommer till personal.	Automate
44	P2	Det kan ju också leda till att man identifierar områden där man hade kunnat förbättras eller utvecklas.	Informate
45	P2	Så låt säga att man har ett informationssystem som mäter utsläpp eller energieffektivitet. Då kanske du kan hitta liksom vart någonstans i processerna där det skulle kunna gå att göra effektiviseringsåtgärder. Och det är inte bara liksom miljömässigt bra, utan det kan ju också vara bra för kostnader. Låt säga att du kan dra ner på liksom energianvändningen för att du blir mer energieffektiv någonstans under vissa tillverkningsprocesser,	Eco-efficiency
46	P2	det kan ju vara positivt på liksom aktiepriset och, och värdet på företaget, för att det sänker kostnaderna.	Returns, synergies

47	P2	Och samma sak gäller egentligen, liksom materialanvändning.	Eco-efficiency
48	P2	Det finns ju också informationssystem som kan mäta sånt och liksom kan vi återbruka mer material i byggnadsprocessen eller sådana saker, och då pratar vi återigen om någonting som både är miljömässigt hållbart men som också kan vara kostnadseffektivt.	Eco-equity
49	P2	Så att där skulle jag definitivt säga att det mestadels ses som positivt om man identifierar sådana här informationssystem som man kan använda både för att ta in data, men också för att sen kunna använda datan till att effektivisera processer ytterligare.	Informate
50	Valdemar	OK, ja. Ja. Intressant, för här nämnde du att alltså mestadels positivt, men nu, nu ställer jag lite den kritiska frågan här: Men vilka risker ser du idag eller vilka kostnader ser du i, i samband med såna här initiativ?	-
51	P2	Ja, men dels, så nu... Nu har jag inte något liksom exempel på informationssystem som jag inte tycker funkade bra men bara så här spontant kan jag väl tänka mig att om	-
52	P2	Om det inte är ett effektivt system, om det istället skapar mer jobb än vad det egentligen skulle gjort, det hade ju kunnat vara ett exempel på en dålig implementering av ett informationssystem om det kräver liksom mer resurser eller mer personal.	Green IS risks, data consolidation, automate
53	P2	Så där ska man nog tänka på att liksom det inte får vara för komplicerat och inte liksom fylla den funktion som det är tänkt.	Complexity
54	P2	Och det... och det kan säkert vara lätt hänt att, ja, men för att samla in all den här datan, så krävs ganska mycket kompetens, eller så krävs ganska mycket handpåläggning på de här systemen, och det hade ju varit ett exempel på ett dåligt informationssystem som kanske inte funkade så bra i alla de här aspekterna som jag nämnde tidigare.	Data consolidation, data quality
55	P2	Och sen tror jag också att man som bolag måste vara beredd på att vara flexibel när det gäller sina informationssystem för att det... vi lever ju i en värld som är i ständig förändring, och vi har väldigt mycket innov... innovation på liksom klimat- och miljöområdet,	Flexibility

56	P2	och det kan ju komma nya beräknings processer som man måste ta i beaktande när man räknar ut exempelvis scope 3-utsläpp som är det som man idag har mest osäkerhet när man räknar ut.	Standards and certifications, data quality
57	P2	Eller att man... att det som var bra effektivitetsmässigt idag... så kanske man hittar något nytt sätt imorgon som liksom funkar mycket bättre så jag tror att även om, om det i sig är positivt att man implementerar sådana här informationssystem så tror jag att man som företag måste vara lite på tårna och vara effektiv på att kanske inte implementera någonting som blir alltför tungt i systemen. Utan man måste vara beredd på att kunna göra justeringar och ändringar beroende på vad som krävs och vad som finns teknologiskt tillgängligt.	Flexibility
58	Valdemar	Ok, ja, absolut. Så det här spelar mycket in i diskussionen kring alltså mät-... alltså mätsystem där, där de monitorerar de här olika ja... men alltså faktorerna som resursanvändning, även energiåtgång eller växthusgasutsläpp på... och så vidare. Och här har vi väl kanske pratat ganska mycket om system som underlättar att visualisera vart någonstans i verksamheten släpper de ut mycket växthusgaser. Vart någonstans finns det ineffektivitet? Och kanske även system som arbetar lite med att effektivisera processer, så att man minskar till exempel genererat avfall eller resursåtgång och så vidare.	-
59	P2	Exakt.	-
60	Valdemar	Men sen finns det även en annan klass av gröna informationssystem som jag också skulle vilja... vilja höra lite mer kring, och de har lite mer ja... På engelska kallas de "transformational technologies" där de implementerar en helt ny affärsmodell. Det kan till exempel vara lite mer cirkulär ekonomi där de med hjälp av till exempel inter... alltså internetbaserade plattformar eller app-plattformar där man kan byta och få tillbaka eller reparera produkter och att det blir mer cirkulärt så man sluter den här... Vad ska man säga? Loopen på något sätt. Men de är också ökända för att vara oerhört, oerhört svåra att implementera och, och få av... nyttja på ett bra sätt, alltså hur... Hur tänker du kring dessa alltså till skillnad från dem vi pratat om tidigare? Jag vet inte om frågan verkar...	-

61	P2	Ja, men... jag, jag tror ändå att jag är med på vad du menar, och det som jag skulle säga är det svåraste, om man pratar just om cirkularitet, det är att det inte finns någon one size fits all, och,	Flexibility, green IS risks
62	P2	och det kan ju sen liksom vara skillnad från liksom energieffektivitet till exempelvis som liksom... att det spelar ingen roll vad du producerar. Det handlar bara om "hur produceras det?"	Eco-efficiency
63	P2	Och där kanske det finns enklare åtgärder att ta hand om med ett informationssystem kring energi än vad det gör kring ett informationssystem om cirkularitet för att... för olika produkter så finns det helt olika förutsättningar på liksom vad som går att spara, och vad som går att... att skapa en produkt vidare till en annan användare. Man pratar ju både liksom återbruka, att helt återanvända liksom färdiga produkter, men också liksom återvinning, att ta material från produkter och göra något helt nytt av det, så att det tror jag är den största utmaningen med, med sådana system.	Eco-effectiveness, change impact
64	P2	Och precis som du säger det finns ju många exempel där är även om det är bra miljömässigt, så har det inte varit finansiellt gångbart att ha ett sådant system, och det är ju det som många bolag liksom trilskas med nu, att försöka hitta ett cirkulärt alternativ och en affärsmodell som också genererar inkomst.	Unclear value, trade-offs
65	P2	Och där tror jag just att det är det som är problemet att man inte kan... Ja, det finns nog inget affärssystem som skulle passa för alla, utan där handlar det mycket, mycket mer om flexibilitet och att anpassa det till just sin produkt, och det tror jag kanske är orsaken till att det är krångligare att få sådana system att funka bättre än andra.	Flexibility, change impact
66	Valdemar	Ja, så de... de kräver helt enkelt mycket mer anpassning på något sätt. Om jag förstått det korrekt?	-
67	P2	*Participant 2 nickar* Exakt.	-

68	Valdemar	Ja, ok, ok. Absolut så vi har ju pratat lite om de här olika klasserna av alltså gröna informationssystem, monitoreringsinitiativ. Så det är ju både de här som monitorerar och rapporterar resursåtgången, själva energiförbrukningen, växthusgasutsläpp och så vidare. Även de här systemen som möjliggör effektivisering av produktion och processer där det beror lite mindre på vad ibland produceras, men mer hur man producerar som du formulerade det, och sen även de här lite mer... Ja, men vad ska man säga? Affärsmodellbaserade systemen där... det är lite mer med cirkularitet och så vidare. Men om vi... om vi zoomar ut lite i, i allmänhet, vilka faktorer tar du mest hänsyn till då? Alltså så här lite en... Vad ska man säga? sammanfattningsfråga då, vilka faktorer tar du då mest hänsyn till när... när du tänker investeringar i... vad ska man säga... hållbarhet med hjälp av informationssystem? Sådana system...	-
69	P2	Precis ja, men jag skulle säga att det är... ja, men lite på samma tema som vi har pratat om tidigare. Att om man tänker att det finns både bra och dåliga informationssystem, då hade jag velat sätta mig in i och förstå på vilket sätt det här informationssystemet gynnar bolaget för desto mer det gynnar bolaget, desto bättre och desto mer kommer det liksom spela roll i min investeringsprocess.	Critical investors, strategic justification
70	P2	Så att om de har ett informationssystem som både är liksom miljömässigt bra, där jag liksom i min portfölj då kan tillgodoräkna att det här bolaget har lägre utsläpp eller vad det kan vara än vad andra bolag i samma... inom samma sektor har,	Quantitative environmental performance
71	P2	eller att de har ett informationssystem som kan sänka kostnader och därav göra att bolaget ser bättre ut i liksom relation till andra. Det är sånt som jag skulle ta mest i beaktande.	Eco-efficiency
72	P2	Men det gäller här också att liksom det måste vara konkret vad det är som, som påverkas inom bolaget, för att man pratar ju väldigt mycket nu om greenwashing och sånt där.	Informate, greenwashing
73	P2	Så det kan liksom inte vara heller att man har ett informationssystem som man bara pratar jättegott om, som nästan är lite av en fasad. Jag vill inte höra, liksom för mycket reklam om det, om det inte är så att det faktiskt är så bra som det är.	Silent sustainability

74	P2	Så att det är just det, tror jag att jag skulle fokusera mest på: "Vad är det för värde det här skapar för bolaget?" För att om det inte skapar värde för bolaget, då ser jag inte någon poäng med, med att ha det.	Synergies, quantitative appraisal
75	P2	Men annars skulle jag säga att liksom, om de inte alls har något slags informationssystem, då blir det nästan en kritisk fråga som gör att jag kanske inte hade valt den investeringen från början,	Green IS capital
76	P2	för att om de inte har något slags innovationssystem, då kanske man kan ifrågasätta vilka ambitioner de har att liksom mäta sin påverkan eller att förändra sin påverkan. Så jag tror att första steget är liksom att de har ett informationssystem eller någonting som, som kan mäta påverkan eller inte. Om de inte har det, kanske man skulle inleda en dialog liksom om om det är någonting som de skulle kunna tänka sig att implementera eller inte, och om de har ett sådant system på plats. Då skulle jag analysera liksom hur, hur mycket nytta det är för bolaget helt enkelt.	Environmental goals
77	Valdemar	Okej, alltså, det är ju en ganska detaljerad alltså... Det är ju ganska detaljerad analys i så fall att man går in och liksom kollar på ja, men hur nyttjar det här... Eller hur kan företaget dra nytta av det här informationssystemet? Vilka fördelar bär det med sig, och vad har det för, för påverkan helt enkelt?	-
78	Valdemar	För jag kan ju också tänka mig i och med att man förvaltar fonder då har man ganska många aktier att se till som aktieanalytiker. Då är det kanske fonder på en 60-70-80 olika bolag i portföljen. Och där hade en annan intervju-person tidigare sagt att ja, men dom, dom kollar inte så mycket på detaljerna. De kollar inte så mycket på vad det är för system och alltså hur de fungerar på så vis. De kollar lite mer på de här övergripande siffrorna som du får i de här rapporterna från bolagen. Men det är en lite mer detaljerad taktik hör jag dig berätta om, eller, eller har jag förstått det rätt?	-
79	P2	Ja, precis, och jag tror att där skulle man kanske kunna dra en skillnad mellan, vad ska man säga? En, en fond som har liksom hållbarhet som kriterier versus en fond som faktiskt vill vara med i omställningen.	Types of investors
80	P2	För vissa fonder de är sådana här Paris-aligned och så vidare, och det betyder ju att de tänker att deras innehav	Strong sustainability

		också ska vara klimatneutrala till 2050, precis som fon- den,	
81	P2	medans för andra fonder är det mer att de investerar i bolag, men de vill inte investera i... ja men lite som det vi pratade om innan: exkluderingar, att de har ändå vissa kriterier eller inkluderingar. De har vissa kriterier som måste gälla för att man ska kunna investera i ett bolag. Men liksom så länge de uppfyller de kriterierna då är det fine,	Exclu- sions, weak sus- tainability
82	P2	medans ett... en fond som är liksom ännu mer hållbart inriktad som, som ser sig vara i linje med Parisavtalet 2050, där kan det bli mycket viktigare att förstå sig på hur bolag... bolagen i sig ska uppnå Parisavtalet, för att om inte bolagen gör det, då kan inte fonden göra det, och då tror jag att i de fallen då kanske man går in mer i detalj, för att man måste förstå vilken omställning i bola- get ska göra, och om det kommer vara finansiellt gång- bart... vilka verktyg man har och så vidare.	Critical in- vestors
83	Valde- mar	Ja, oj jag var på mute där. Jo, men absolut, absolut. Och ja, nu kanske vi rör oss lite ifrån den här lite övergri- pande vyn till en lite mer specifik kanske? Men nästa fråga. Men du nämnde ju lite kring du... Du nämnde lite kring olika ambitionsnivåer hos olika fonder, att vissa går ju mycket mer in med kritiska frågor och ställer frå- gor till hur systemet kommer att funka, hur det kommer att bidra, hur det kommer att utformas medan andra kanske kollar lite mer på övergripande siffror. Men om, om vi rör oss mot ett lite mer allmänt exempel, då var det en artikel från 2017 där de undersökte IT-bolag som lanserar hållbara produkter och tjänster. Till exempel nå- got likt med Apples buy-back-program där man kan skicka in sin gamla telefon och få pengar för det som ett presentkort till Apple då, och ofta när företag annonse- rade sådana, då kom det en skarp nedgång i aktiekursen efter de hade lanserat eller annonserat sådana initiativ. Så där funderar jag lite på hur detta spelar... hur detta hänger ihop med dessa faktorer du nämner? Alltså hur... hur kommer det sig tänker du?	-
84	P2	Förlåt, får jag bara fråga... så var det så att de... jag hörde inte, jag tror det bröt lite. Gav de ut presentkort när kunder hade gjort vad då?	-
85	Valde- mar	Skickat tillbaka sin gamla telefon.	-

86	P2	Aha, ok, ok.	-
87	Valde-mar	Yes.	-
88	P2	Men där skulle jag nog säga att... också tillbaka till den här cirkularitetsfrågan, och att det inte finns någon one size fits all. Att jag tror att om man gör såna där initiativ så måste det vara tydligt återigen hur det gynnar bolaget, för att om man exempelvis på ett annat sätt hade kunnat visa att för varje mobil vi får tillbaka så kan vi liksom... så tjänar vi sexhundra kronor. Då hade man ju kunnat se att då hade bolaget tjänat på varje mobil som skickades tillbaka, även om det ser ut som att det är pengar som som går ut med de här presentkort, så jag tror att det kanske hade varit en... liksom det kanske hade varit bättre om man varit mer tydlig där, för jag tror inte att investerare generellt är såhär super-hyped på att man gör någonting nästan så välgörenhetsmässigt.	Unclear value
89	P2	Utan det är väldigt tydligt att sådana hållbarhetsinitiativ måste vara bra även för affären, och där kanske det finns andra sorters hållbarhetsinitiativ som inte inkluderar att liksom ge bort presentkort eller så som är ännu viktigare för företagets omställning,	Weak sustainability
90	P2	eller att det kanske finns andra metoder man kan göra som ännu bättre uppnår samma syfte.	Synergies
91	P2	Så att jag, jag tror nästan att... Nu är inte jag insatt i just det här exemplet, men jag kan tänka mig att det är något sånt att man, man tycker inte att det känns tillräckligt, liksom seriöst, och att man kanske inte förstår vilken positiv inverkan det hade haft på, på bolaget liksom.	Unclear value, change impact
92	Valde-mar	Ok, så oklar affärsnytta helt enkelt. Eller lite grovt skuret kanske, men...	-
93	P2	Ja men ändå lite så, tror jag ändå att det är att man skulle kunna säga. För att jag tror som aktieägare så kan man ju bli lite förskräckt om liksom... det låter som att bara, "men de ger ju bara bort massa presentkort liksom," och att man inte förstår den faktiska miljömässiga nyttan eller nyttan för affären, så att jag skulle säga att det är en ganska bra sammanfattning.	Quantitative environmental performance

94	Valde- mar	Ja. Bara... Ja, ja, men det är lite... Det är lite intressant med din sammanfattning du kommer med, för där var det inte bara att, alltså, affärsnyttan kanske kunde vara oklar, men även miljönyttan kunde vara lite oklar på, på samma... på samma tid, och att det också kunde skrämja bort lite investerare på något sätt. Och här tänker jag ju särskilt i samband med att, ok... att affärsvärdet kanske inte alltid är lika tydligt med sådana initiativ. Och det tänker jag särskilt i och med att investerare, de bedömer ju ofta värdet av investeringar med hjälp av traditionella metoder såsom nuvärdesmetoden eller andra finansiella metoder som diskonterade kassaflöden. Men många av de här fördelarna som du nämner, till exempel att de får bättre koll på sina processer: vart har de stor ineffektivitet, eller vart har de stor ineffektivitet där... Vart har de stor energiåtgång någonstans? Så de här fördelarna är kanske lite icke-finansiella, särskilt så här med att de ser bättre ut för sin... sin omvärld och sina intressenter. Är det svårt att värdera de här, i alltså finansiella, liksom mått kan man säga. Alltså hur tar ni... tar man sig an den här utmaningen?	-
95	P2	Ja precis, jag tror, återigen så är det. Det är inte i alla aspekter som man kan göra det. Ja, vad heter det... sen så kommer vi alltid försöka med kriterier när man pratar om miljömässig hållbarhet och biologisk mångfald.	Biodiversity
96	P2	Det kan vara väldigt svårt att kvantifiera liksom hur arbetet med biologisk mångfald kommer att ge utveckling på aktiekursen. Men ändå så måste bolaget jobba med sådana frågor.	Quantitative environmental performance
97	P2	Så att det är inte alltid som det går att kvantifiera, men däremot om vi tar biologisk mångfald som exempel bara, för att det är ett så liksom diffust... diffust tema,	-
98	P2	så, så kommer det mycket mer lagstiftning exempelvis inom biologisk mångfald	Compliance
99	P2	och liksom krav på hur bolag måste återställa natur om, om man liksom... om man som byggbolag exempelvis bygger på obebyggd mark och då kanske man tänker på det mer ur ett riskperspektiv. Att liksom om man inte har sådana här protokoll på sina processer, i liksom ett... i, i ganska många olika frågor så hade det liksom riskmässigt kunnat påverka bolaget	Risk reduction

100	P2	och då kanske man exempelvis hade justerat riskpremien på grund av det här för att man ser att det finns en högre risk för att man antingen inte kan fortsätta sin affär som man har gjort tidigare, eller att man till och med får böter eller så för att man inte lever upp till vissa krav som finns.	Compliance
101	P2	Så att det är liksom ett sätt och det... jag tänker på riskperspektivet där du försöker få in det i riskpremien.	Quantitative appraisal
102	P2	Men ett annat sätt är ju att liksom försöka konkretisera vilken påverkan som antingen liksom de såna här regulatoriska initiativ eller effektiviseringen av processer har på liksom den faktiska produktionen och faktiskt flöden av... av intäkter och kostnader.	Compliance, eco-efficiency, quantitative appraisal
103	P2	Och där kan man ju... om vi tar ett exempel på ett bolag som är energieffektivt i sina processer. Det kan ju leda till lägre kostnader och det är någonting som du faktiskt kan sätta in i en DCF-modell och modellera att det skulle ge en positiv effekt på aktiekursen, och samma sak om det är något som ger ökade kostnader så kan du också göra det.	Quantitative appraisal, new markets
104	P2	Alternativt om det är någonting som driver efterfrågan på deras tjänster, exempelvis om vi pratar om ett bolag som kanske säljer såna här informationssystem eller vad det nu kan vara, då vet vi att fler och fler bolag kommer vilja att skaffa sig sina egna informationssystem för att samla in data.	New markets, quantitative appraisal
105	P2	Då kan ju det vara någonting som driver efterfrågan och då är det ju på... på intäkter som man kan räkna in det. Sen säger jag inte att det är lätt att kvantifiera sådana här liksom saker med, men jag vill ändå påstå att det går att göra det. Så att det är i alla fall så som vi försöker jobba mer och mer: att man försöker konkretisera och försöker kvantifiera även liksom hållbarhetsaspekter.	Quantitative appraisal
106	Valdemar	OK alltså så ur ett... Vad ska man säga? Kvantitativt perspektiv så är det ju mycket... De här faktorerna kring riskbaserade metoder, som att: "Ok, riskerar man att man inte kan fortsätta som tidigare eller riskerar man till och med böter eller vite?" Och sen även... även det här trycket mot att alltså sänka kostnader med hjälp av mer effektiva processer och då blir det lite av en win-win-situation kan man säga med effektivitetsinitiativ.	-

107	P2	Exakt.	-
108	Valdemar	Ok, ok, ja. För på den punkten... Därför beror det kanske på det här med att vissa företag gör ju sådana hållbarhetsinitiativ för att se bättre ut för omvärlden och sina intressenter. Men hur... hur hänger det ihop med den kvantitat-... kvantitativa utvärderingen tänker du? Är det också något som går att...?	-
109	P2	Ja alltså, just för då menar du lite så här att man ser... försöker se bättre ut än vad man egentligen är och så?	-
110	Valdemar	*Valdemar nickar*	
111	P2	För där skulle jag väl säga att det... kanske den största risken där kanske handlar snarare om liksom ryktesrisk.	Greenwashing
112	P2	Att det finns en risk att flera investerare drar sig ur om man inte lever upp till de förväntningar som man har satt när det gäller liksom hållbarhetsarbete.	Green IS risks
113	P2	Så där skulle jag säga att där kanske många investerare hade varit oroliga för att... för att många helt enkelt säljer av aktien om den inte lever upp till förväntningarna. Men sen så även där, så kommer det mer och mer liksom regleringar.	Quantitative appraisal
114	P2	Så exempelvis så är EU på gång med att sätta ett regelverk kring greenwashing där man liksom kan få böter och så om man på ett tydligt sätt liksom gör reklam för någonting som man inte lever upp till. Det finns exempel på liksom oljebolag som har sagt att de ska sänka sina utsläpp samma år som de har påbörjat nya liksom oljeupptag eller så. Och... och då har de kunnat bli dömda i rättegång för att man har kunnat påvisa då att liksom, det hänger inte ihop. Så på så sätt kan man ju igen göra det till en... till en finansiell risk om det påverkar kostnaderna.	Compliance
115	P2	Men jag skulle säga att det är absolut svårare, för det är inte alltid lätt heller att veta när ett bolag... när det stämmer det de säger eller inte, utan det är ju någonting som tiden kommer bevisa. Men låt säga då att ett bolag har visat att de... eller säger att de ska bli mycket mer hållbara och sen år efter år, så visar de här siffrorna på att man inte lever upp till det. Då finns det större och större risk att investerare liksom börjar tappa tålamodet lite och dra sig ur, och så vill ju ingen ha det och då	Informate, verifiability

		kanske man lämnar redan tidigare för att man är rädd för den risken.	
116	Valde-mar	OK, absolut. Nej, men det... det är helt förståeligt i och för sig. Så ur de här, liksom faktorerna som jag... som jag har förstått det tills vidare, så var det... så var det mycket fokus på att "ok, företag som signalerar att de med ett initiativ kanske kommer att leva bättre upp till existerande eller ny lagstiftning," till exempel SFDR som du nämnde tidigare eller kommer att hjälpa med rapportering, alltså, miljörapportering. Där är det ju nytt initiativ, CSRD, tror jag det heter för stora bolag.	-
117	P2	*Participant 2 nickar instämmande* Exakt.	-
118	Valde-mar	Ja, så det är mycket de här faktorerna med att alltså regulatoriska faktorer som driver på och det är ju kanske de signalerna som... vad ska man säga, verkar attraktiva för investerare när de hör att "ok, det här initiativet kommer att bidra till att de efterlever de här reglerna bättre," eller att "det här kommer att effektivisera deras processer." Det är kanske också något som som låter bra för många investerare. Men finns det andra saker som investerare lyssnar mycket efter alltså bortsett från regulatorisk och liksom effektivitets faktorer som vi pratat om tidigare.	-
119	P2	Precis alltså. Jag vet inte om det här har att göra så värst mycket för, om, liksom informationssystem, men någonting som vi jobbar väldigt mycket med, och som vi pratar med är väldigt många investerare om, det är att hitta de här bolagsskattebasen som verkligen kan vinna på omställningen. Och där finns det ju liksom flera olika.	Eco-effectiveness, eco-equity, new markets
120	P2	Till exempel, låt oss säga ett bolag som håller på med sortering och liksom pantsystem då liksom kan ju man verkligen se att det finns potentiella liksom drivkrafter efter deras efterfrågan när vi går mot ett mer cirkulärt samhälle där fler och fler länder exempelvis sätter reglering på att man måste återvinna mer, mer plast eller dylikt, eller företag som säljer sina informationssystem eller vad det nu kan vara för någonting.	New markets

121	P2	Det kan även vara vindkraft, solkraft, liksom alla sådana här bolag som vinner på den omställningen som vi går igenom och det skulle jag säga är liksom en av de stora sakerna som vi diskuterar med investerare mycket och som är väldigt attraktivt från ett investerarperspektiv, och där kanske det inte är liksom lika viktigt och återigen, liksom hur hållbar verksamheten i sig är. Utan liksom när man bygger de här vindkraftsparkerna då liksom... Ja, men då kanske är det företag som bygger om vindkraftsparkerna har utsläpp i produktionen, men att ställa det i relation med vad man sparar för utsläpp genom att använda förnybar energi versus fossil.	Eco-equity
122	P2	Det kan liksom ändå vara ett väldigt intressant investeringscase så att just möjlighetssidan tror jag inte att man ska glömma bort liksom. Det är också väldigt viktigt.	New markets
123	Valdemar	Absolut, absolut ja. För det det kan... Det kan ju lätt hända att man glömmer bort möjlighetssidan som du säger när man pratar mycket om effektivitet och leva upp till regelverk och standarder som ISO 14001.	-
124	P2	Exakt.	

Appendix 4: Interview With P3

Line	Person	Content	Code
1	Researcher	Now, we will start the interview. To kick off our conversation, we really like to hear a little bit about you and your background and experience related to the research topic. Could you please tell us about yourself and your involvement or interest in green information systems?	
2	P3	<p>Yes, and as I think my colleague who you originally reached out to mentioned our company is a government owned company. So as such we do not invest in Green IS not for the investment purpose, at least. Maybe when we acquire information systems we look at the ESG parameter, but then it's from that perspective.</p> <p>Um, personally I have a long background in IS and IT, uh it goes back to the.</p> <p>Late or the start of the 90s where I've worked in many different roles. As internal consultant, as external consultant for IBM, for CGI, for.</p> <p>Yeah, various BI companies. From yeah, what can I say, the, the green agenda of course as we all know has kicked off the recent years and have really become very, very important and also for a company like ours.</p> <p>We are actually changing all our vehicle equipment from the black energy consumption engines to electrical vehicles. So I guess in the late 20s, start 30s, we are all green in our company, and that's of course for us a very, very important message to bring out because I think we would like to be part of the dance of the.</p> <p>Sustainable environment, sustainable business and also like to attract more customers because of the green agenda.</p> <p>So. Yeah, I don't know if that fits your your question about my... my background and uh.</p>	(LongIT)
3	Researcher	<p>Oh, absolutely. It was, really helpful because we really want to focus on this interplay between well the IT background that you have and also the ongoing sustainability initiatives that are becoming very relevant for well, a lot of firms within the transport industry, but especially publicly owned ones such as the company. So, we've already touched upon the topic of sustainability a little bit, which is our overarching topic for this interview.</p> <p>Yes, uh, we would just like to ask you this a bit more of a background question really. What is your perception of</p>	

		environmental sustainability is, How would you define it in, in your opinion?	
4	P3	I think I would, define it that way that. Yeah, yeah. Maybe could you ask the question again because, I think I lost a little track on my thoughts. So just to be 100% percent precise on the answer.	
5	Re-searcher	No worries, no worries. I'll just reiterate. So we would just like to hear more about your perception of environmental sustainability, how would you define it in your terms?	
6	P3	<p>Yeah I would define it that way that we all as individuals and as Companies Act in what can I say in a sustainable way, seen from all three parameters in the ESG. I think, we all faces the climate change. So this is very important, it's really scary what we can see about predictions for the future. Because of the environment and climate changes. So I think it's very, very important that we all act responsible in that direction from the S part of course.</p> <p>We would like to have a diverse world where everybody, uh, has a chance, and no matter what the race, sexual observation, you name it. And also we want to see some diversity in the boards of companies actually to. To get that broader view of. Oh yeah broader mandate of the steering the companies.</p> <p>And that maybe also goes for the G. The governance part. I don't know if that was a good explanation of my perception, but I think it is very very important.</p>	(PerSust)
7	Re-searcher	<p>Yeah absolutely, absolutely. And I think this ESG perspective that you mentioned in pretty detailed terms is very relevant for the investor perspective as well, so that's also a bit of our angle so to speak because in terms of sustainability and, although we acknowledge that social responsibility and social sustainability.</p> <p>Are very important topics. Um. Our focus today will be a bit more on the environmental side that the climate change side and the pollution side and the other types of environmental sustainability aspects.</p> <p>Because oftentimes, um, I guess as in your experience as a consultant and as your experience within our company, I</p>	

		guess that sometimes you encounter situations where environmental sustainability and environmental performance and financial performance or business value are at odds and they engage in a compromise sort of situation. How would you approach that, how do you tackle that kind of challenge?	
8	P3	<p>Yeah, first I would say generally I think the two things goes hand in hand, as I actually think it from an investor perspective. I think that in the long term you would benefit largely from investing in green and sustainable business, because I think they have the best chance to actually survive to change, to act, to change this in in regulatory terms.</p> <p>Because we know that the in the EU and probably also the US would regulate this.</p> <p>And if you are aware of the importance of the E, then I think you are more adaptive to changes and that would be become competitive in the future that would be a parameter that would be a competitive. So actually, generally I see that that that businesses that are.</p> <p>Focused on the E, it would also be more valuable. So from an investor perspective, I actually think that here you could get the best returns of investments. Of course as you said there could be trade-offs the old black energy sector and I think we can mention a lot of industries that would struggle in this change.</p> <p>So, of course there would be trade off where you see that the important business for the world would struggle in getting sustainable and would still be attractive from an investor perspective.</p> <p>So, so, how would you then balance it?</p>	(Green-Invest)

9	P3	<p>I don't think that we could just close the eyes for all the black industries and say we wouldn't invest in those because, they are also a part of the total solution. I guess so, so I think that the some industries would be the leaders and some would lag behind, but those lagging behind would definitely have some, would be able to piggyback on.</p> <p>On the leaders and actually catch up in that way.</p> <p>So, so I would not be that scared to also invest in in the in the black sectors because I think.</p> <p>In a certain time they have to catch up, but we cannot just. Not just ignore the black businesses today that will be a failure that wouldn't possibly, also slow down what can I say, the leaders because they are also. If you look at the whole supply chain I think they are also reliant on some of the black industries. Let's take the electrical car industry. I think the battery product production is definitely not green today but in a total perspective.</p> <p>Uh, the movement is green. And that means that I have no problem in investing in battery. Uhm...Making companies in the belief that that they would overtime become more green.</p>	(Green-Invest)
10	Re-researcher	<p>Absolutely, absolutely. So I think that's an interesting point you made or a couple of interesting points you made and that kind of also answered our next question that we were thinking of asking. So that's also really great because in terms of synergies, I just want to understand, understand you correctly here. So you mentioned that companies that focus on environmental sustainability, they are better at adapting to these constraints that environmental sustainability imposes on companies so that they can in a way become a bit more innovative and and.</p> <p>Adapt to the market of the future, I guess. Um, yeah. OK.</p> <p>And also an interesting point you made about sacrificing a little environmental sustainability to create a greater impact on other places such as for example, the better manufacturing process as you mentioned, creating a positive impact elsewhere while maybe creating a some somewhat negative impact in their own operations I guess. So that's a that's a pretty interesting topic that kind of relates to green information.</p> <p>Systems as well. Um. So with that in mind, um, I would like to move on to our next, well, slightly overarching questions still because.</p> <p>A lot of companies they, they claim that they are focusing on these sustainability goals and they're implementing these sustainability initiatives, et cetera.</p> <p>But where do you think they are in terms of sustainability today compared to where they should be in your opinion?</p>	

11	P3	<p>Well, it's a tough question because, um. What can you say?</p> <p>Companies are not put in place to what you say, generally save the world.</p> <p>So, so of course companies live in a business climate where they have to be competitive.</p> <p>And I think what can I say. The movement towards, um, sustainable environments. Uh yeah practices.</p> <p>Has started and actually has an exponential growth. So generally, I think I would not expect companies to be.</p> <p>In general, more mature than than we see today. Of course you could always pick out specific sectors and say OK, they they lack behind, they could do more.</p> <p>But, but. For being realistic, of course. If you are, if you are what can I say. Very optimistic and and also. Yeah, a bit Greta Thunberg, uh ish. Um then you would claim that the businesses are not doing enough. But, but I simply think we have to be, we have to, have some patience also here because we could not change it overnight. It is actually a process. So in generally, yeah, in the short answer I think in general I think we are at a good stage of course climate.</p> <p>Um. What can I say, researchers say that we we we really lack behind that it's too late and and so on but, but, I have very hard to believe that that the companies at their self, could be.</p> <p>Yeah, more mature than they are today, Yeah, it was a long and quickly answered. But uh.</p>	(CorpSus-Reality)
12	Re-searcher	<p>No, but it's also a long and complicated topic so like that that is that is justified. So I think that the some of the points that relate a lot to regulatory themes such as they they kind of push companies because companies on their own aren't necessarily.</p> <p>Uhm, incentivized that way that it's a lot about competition still, as obviously business works.</p> <p>However, um. If we are focusing on the green information systems aspect, a lot of companies are now implementing, a lot of companies are now implementing green information systems to improve environmental performance, for example through monitoring and reporting greenhouse gas emissions and using these systems, energy and carbon management systems to calculate their carbon footprint in an accurate way and verifiable way. And so I was just thinking from your perspective, what are the benefits of doing this?</p>	

13	P3	<p>The benefit is uh making transparency, uh so, so you as a consumer can actually be confident that when a company claims that they are and so and so green and you also have a a.</p> <p>A reliable source, um, to to actually trust that that is correct. Um, and I think it, yeah, it's also from a regulatory. Point of view it becomes more and more important. We also from from our company, knows that the that this scope 3 that we have to actually monitor the carbon footprint from our suppliers and their suppliers, and and so on, through the whole supply chain so so.</p> <p>I think there's a regulatory, uh, perspective on this. You, you must do this. But I also think that this transparency is so, so important because yeah, everybody could claim to be green but, but if they cannot prove it and in some, what can I say, some accepted way of measuring it, then then I think there would be a lot of fraud in this area because everybody would claim.</p> <p>They are very green, but we have to have the the evidence.</p>	(TranspRegComp)
14	Re-researcher	<p>Yeah, absolutely. So it's it's all about the verifiability part that people can trust the numbers that are behind their sustainability initiatives. And Speaking of numbers, this kind of brought me to a, a follow-up question here because one of our previous interviewees, she told us that Scope 3 emissions calculations, they are notoriously difficult to calculate and they they're hard to get accurate. I don't know if you, how much experience you have with scope 3 calculations, but.</p> <p>This kind of brings me to the risks aspect of such initiatives. We wanna because, a lot of research points to several risks and costs connected with implementing and designing using these systems for monitoring. One could be, you know you have data from many different sources within the organization also from outside of the organization when calculating scope 3 emissions from suppliers etcetera. So there's a lot of data consolidation work and making sure that.</p> <p>The data formats fits also the issue of maybe data not being properly cleaned and there has to be a lot of manual work for example and and many other risks such as oh unclear business value like how does this actually help the the business goals we've set up. So I'm just thinking in terms of risks, what kind of risks and costs do you see in such initiatives?</p>	

15	P3	<p>Yeah, as you mentioned, I I think the risk today is that the, the reliability of those carbon footprint. Data is not very high. I think from a, I think IS industry itself are working very, very hard on finding solutions.</p> <p>So probably in the future you would see some kind of uhm. What can you say? Yeah, centralized database where you have validated the carbon footprint on an EAN level, so you say, OK, this this specific raw material.</p> <p>We have the, the validated exact CO2 numbers. Uh, this raw material goes into a semi finished product with a lot of other materials.</p> <p>Here, we also have a validated as CO2 data in a Central European database or worldwide database, but we are not there yet. So today there's a lot of risk because, we rely on that we ask our suppliers to actually give us a carbon footprint data on their products. That put pressure on them that they should ask their suppliers and then you go along with the chain, and of course the chain is not stronger than the weakest link.</p> <p>Uhm and, and I I think the the the data.</p> <p>The, the big risk today is that the, the data validation is probably not very high.</p> <p>But it is the movements, and the pressure comes from uhm... regulatory uhm things from our governments, our European Central organizations, and the IS industry itself is a big business in in this. So, so I know we are, we are for example running SAP in our company, and I know SAP is investing a lot of money into, into this. So my my belief.</p> <p>Is that we, maybe. Five or seven years, uh have uh, quite robust solutions where we could trust the, the carbon footprint data, and we also have what can I say, processes where data just flows in when we receive an invoice from a supplier.</p> <p>There's totally transparency in what we have bought, and which carbon footprint is related to, to what we have bought. But we are definitely not there today.</p>	(CFDR), (EFS), (DSCFD)
16	Re-searcher	<p>No, absolutely. And that's also a thing a lot of, a lot of literature focuses on that companies struggle with these data questions. As you mentioned however, one of our previous interviewees when we asked him about this question, he said that well, investors, they're generally not that detail-level when evaluating companies they invest in because they typically have you know 60-70, 80 different assets that they have in their portfolios. So they only do like the, the high level numbers, the chewed... chewed up and aggregated data.</p> <p>I guess, Um, so just to be a bit of a devil's advocate here, Um, so ho, how does this relate to the investor perspective? Is it, is this something you see investors looking more and more into or is this maybe something that investors might</p>	

		not touch so much upon, if that makes sense? Yeah, it makes sense.	
17	P3	<p>I think you're right and your previous interview. Is right that. In, from an investor perspective, you, you don't have the, the insight into the machine room of the companies, you have to rely on, on what can say, official known.</p> <p>Financial statements and, and so on. So of course I would believe that, that it is high level perspectives but, but when for example choosing sectors you, you would know that for example Vestas, the Danish famous windmill.</p> <p>Company, yeah. They. They um. How can I say. They are part of, of green solutions but as an investor I don't know how green the production of the, the wind turbines actually is. I believe it's not very green, because there's a lot of glass fiber and so on, it cannot be very sustainable to, to produce and so. So from an investor perspective I think the end product yeah it it. Is part of the, the green solution of, of green energy and and that's from an investment perspective what you invest in, in the machine room, yeah.</p> <p>Today you, you don't have the, you don't have the public very detailed ESG uhm..reporting. But, but of course in the future when you get the more detailed ESG reporting from the companies that goes along with the financial reporting you, you have the possibility to, to take a more just.</p> <p>Decision, based on, on more knowledge.</p> <p>And I think it lacks uhmm...today it lacks uh.</p> <p>We lack a bit information or a lot of information about the ESG in the machine.</p>	(LDESG)

18	Re-searcher	<p>Yeah, for sure. And that that also resonates a lot with what our, our previous interviewee said. But in the future as, as ESG reporting as you mentioned becomes, well eventually will become more and more detailed and more and more demands will be placed in ESG reporting, the more insights there will be into the ESG work, if that's correctly understood, right. Yeah, OK, I see, I see. So moving further from this, I guess that your company, you mentioned that they have.</p> <p>A lot going on with SAP as their ERP system, and SAP is investing heavily into the environmental sustainability aspect of their systems, integrating I guess environmental and carbon monitoring and reporting.</p> <p>So I'm just thinking in terms of these updates being pushed to the ERP system at our company. How do you approach this?</p> <p>This change where the SAP system you're using will have more sustainability elements introduced in the future versions of the system. Is that something that?</p> <p>And influences your work in some way.</p>	
19	P3	<p>Yeah, it does. Because I'm also working, I work as an Enterprise architect here in our company. That means that I have, I have to have an realistic view on our systems and that includes also sustainability solutions.</p> <p>So it would definitely, uh, let's for example say that I want to, to optimize, or people helping optimize our procurement processes and the IS support for, for those.</p> <p>I of course have to think in this uhm..sustainability issue and the, the possibilities for, for monitoring the, the scope 3 for example. So it would be part of daily life of IS in every company. I think, and as an enterprise architect.</p> <p>Responsible for, for highest strategies around. Solutions, yeah. This would be definitely be, be part of my work. It's all already part of my work.</p> <p>We have a sustainability officer, that I often speak to in the company and, and we are also struggling because the IS system is not mature. We cannot by stand up today , where, where we could just get the data and even if we could we heavily rely on, on the quality of data from, from our suppliers, and their supplies and so on. So, so it's not just solves by, what can I say.</p> <p>An optimal IS solution that can collect the data, we also need to make sure that they have a data validity, as we have spoken about before.</p> <p>Gets better, and get reliable.</p>	(ERP-CFM)

20	Re-researcher	<p>Yeah, definitely.</p> <p>Hmm, yeah. So I I think you already mentioned some of the factors that you can think of, and, and factors into your work when implementing, and, and optimizing these information system solutions, when implementing these sustainability support systems from an information technology perspective. So you mentioned</p>	
21	P3	<p>I think they are, they are very, very much integrated into our core business processes because this is not, this is not processes lives isolated on top of or, or below or on the on the side. This is actually something that is deeply integrated into daily business processes.</p> <p>So, so we have when, when buying stuff, we have to make sure that this procurement process takes the data from the source and, and bring it all the way into some kind of, yeah, carbon footprint ledge, or what we can call it.</p>	
22	Re-researcher	<p>Yeah, absolutely. So the the data has to be.</p> <p>Imported correctly and from the right source to the right destination as you mentioned and so these data, these data quality issues and these.</p> <p>Electronic data interchange issues as well they they have to be fixed, but other, other factors that are important when when working within information systems and sustainability. We mentioned some data quality issues, but are there other issues you encounter?</p>	
23	P3	<p>Again, I I think that uh.</p> <p>This topic really has to be.</p> <p>Integrates, in, in the core business processes because actually a procurement process or hiring process, or manufacturing process, or warehouse process, or whatever it is. All these activities are related to some carbon footprint emission and also when, when we are running our vehicles we are burning today diesel in the, in the future.</p> <p>Electricity that could be either uh, green electricity, or black electricity, or hybrid electricity. So, so I think all the business activities has to incorporate this sustainability factor.</p> <p>So, again it's not something that lives on top of and that really put a.Giant pressure I think on the ERP system because they should for all kind of business activities that has ESG related stuff and.</p> <p>This should actually be integrated in the business process itself.</p> <p>Um. Because all the ESG is activity-based in some, some, some way, but if we have a kind of activity in the company, there would be a a carbon footprint relation to that.</p>	(ERP-CFM)

24	Re-researcher	<p>Yeah. OK. So I see that there are a bit. Well, OK.</p> <p>Not too separate but too very linked tracks I guess. Both the business processes where sustainability process, sustainability factors have to be included as well as the supporting information systems infrastructure such as ERP systems where they have to support these processes that focus on sustainability in an increase to an increasing degree. While the ERP systems are pressured to include these as well. So there there are two parallel.</p> <p>Change tracks if I'm correct or.</p>	
25	P3	<p>Yeah.</p> <p>Yeah, yeah, I'm I'm not sure I understand you correctly, but, but from my perspective, the ERP system is the backbone in every company and here you have the activity based.</p> <p>Process that actually has a carbon footprint relation, so it means that every activity that is.</p> <p>Supported by an ERP system.</p> <p>Has to collect, monitor, report the related carbon footprint.</p> <p>That is internally in, in your company, externally of course you have to.</p> <p>Capture all the data from the, the ,your, your surroundings.</p> <p>All your all the, the partners that that you do business activities with, you have to rely on that they in their ERP systems does the same, so they could provide validated data to you and that goes along the whole supply chain.</p> <p>And so, it also for us means we're not a trading company, so we don't sell very much but of course we, we are also a big what can you say?</p> <p>Real estate owner and we rent out some of that stuff, and of course also the companies that that, that rent buildings from us has to come to us and say how much CO2, how much carbon footprint is there on, on your your buildings.</p> <p>Yeah.</p>	(ERP-CFM)
26	Re-researcher	<p>OK. Yeah. So the the rental business is well that that's also of course another business process to take into account. But the interesting thing is that or in my in my opinion I think the interesting thing that you really brought up here is that every process has to collect and monitor these data. So it becomes a pretty big change project in a way to collect all these data in such an extensive.</p> <p>Um, manner I I guess, yeah.</p>	

27	P3	<p>And one little point more here. We have a huge maintenance business of our vehicles.</p> <p>That means that we buy stuff uh that already has a carbon footprint. But we the the, the materials that that we would buy acquire or also the maintenance process itself where we actually maintain our vehicles that we consume these products that we have bought means also that activity should also collect CO2 data.</p> <p>So, so actually I really mean that that that most of the business processes uhm..supported by ERP system.</p> <p>Would have some in bills embedded CO2, uhm..on our environment so um can say collection or monitoring them.</p>	
28	Re-searcher	<p>Absolutely, yes. So it's it's becoming more mainstream I can, I can understand uh with with ERP systems especially such as SAP integrating it more and more into their into their systems and solutions.</p> <p>But moving, moving a bit back to the investor perspective, Although it's been really interesting to hear about the, the data and the process and the and the change aspects of the other process. A lot of these factors such as the change impact of such initiatives where processes is something now we have to monitor and collect environmental data and do things differently, or where information systems have to be changed or updated either from the supply side or through customizations or, or configurations and in terms of data quality.</p> <p>That might pose a risk to the accuracy of these calculations etc. And many of these things are.. well..non financial. They, they're hard to quantify in numbers and in, and in money I guess because a lot of investors they value their or appraise their investments based on traditional methods such as net present value or discounted cash flows. So they see cash flows in the future and see OK how much would they be worth.</p> <p>Today, for example, by discounting the internal rate of return, et cetera.</p> <p>Um, so I guess the challenging part is quantifying these risks and these, these downsides I guess, or do you have them? How would you approach this challenge? Or how, how would you see investors approach this challenge? It might be a tricky question.</p>	

29	P3	<p>Yeah, because I, I think investors. Has to accept.</p> <p>That there are regularity, put on to every industry and that, that would come with the costs, and, and that goes for every industry, I cannot point out many companies in the world that would not be affected by this regulatory constraints. So I think it is something that would be embedded in every company.</p> <p>And in some way you would see, um, see additional costs on the balance sheet.</p> <p>And so from a financial perspective, you see that the companies have to invest in this and it's not, it's not very clear what the, what the return of this investment would be, but it is simply.</p> <p>Yet to be compliant to it is, we're going to say the.</p> <p>If you want, if you would like to be in business, you have to comply with this. So it's not something that you can, you can turn down and say OK, we, it would not be, it would not gain our, it would not be financial objective for us to invest in this.</p> <p>You cannot decide that yourself so. So I think from an investor perspective you have to accept that there would be put a burden on every company to, to act upon this. It would not in itself be.</p> <p>Maybe financial uhm..</p> <p>Yeah. There, there would be, yeah, a great financial benefit from this on the other hand.</p> <p>As we said, if you, if you look at it from the top, I think again.</p> <p>The, the most sustainable businesses would also have the best opportunities to survive in a in a future competitive environment. But that means that that does not mean that it doesn't come with a cost.</p> <p>To, to be compliant with these regulatory, actually.</p> <p>So yeah.</p>	(CEIR)
30	Re-searcher	<p>Yeah, definitely. And regularly, regulatory factors, uh, really play a big role here I guess. So I think all companies, as you, as you mentioned, are increasingly being pressured to do this. There's also a EU directive coming out now, the CSRD Corporate Sustainable Reporting Directive, which kind of forces a lot of large EU organizations to, to report quite detailed ESG data for their businesses.</p> <p>And that, that's mandated by law. I don't know if your company is affected by this as well,</p>	
31	P3	Yeah.	

32	Re-researcher	<p>OK. OK, you are. Yeah. Because I guess some companies do it more effectively than others in implementing these monitoring systems, environmental monitoring systems. So I guess that might have an effect on investor perceptions, a company that might do it in a cost effective way versus another company that might struggle a bit more with implementing this. I don't know if this might be something that could influence.</p> <p>The, the perspective somehow or how do you think?</p>	
33	P3	<p>Yeah, maybe it could.</p> <p>But of course, businesses are different. So, so for some companies like, yeah, what can you say consultancies and are not manufacturing things that are not procuring a lot of stuff for their supply chain. It would be easier for those kind of business to comply with this regulatory stuff.</p> <p>Very heavy manufacturing companies that rely on, on uhm...very complex supply chain with a lot of contributions to this total CO2 footprint would struggle a lot more. So from an investor perspective, you could all of course argue that, yeah, OK, those companies that, that are not affected that much would not have this additional cost and because of that could be more.</p> <p>Uh, interesting to, to invest in. Uh Yeah, but again.</p> <p>I think on the other hand, every investor needs to have a balanced portfolio.</p> <p>All in all I I think that the.</p> <p>I think the IS industry and, and uh, the EU for example, should be part of the solution for everybody. I, I don't think that we as individual companies should, should find our individual solutions on this because that they would not be transparent, that would be not be efficient so.</p> <p>I think that there is a movement again the, the big IS companies investing heavily in this the EU are, are making standards for this. I really believe that we would get some kind of of central European or worldwide database for, for validated data in the future that everybody could rely on. It's easy to get access to, and the IS systems that should actually.</p> <p>Carry these data through the process and collect the, the correct data would also be capable of doing that. And that means that every business are on the same page, at least if they want the same ERP system, but I think every.</p> <p>System, again which ERP systems are the backbone in, in, in, in the companies and I think.</p> <p>In a in a competitive future, every year ERP system has to incorporate this.</p> <p>And that would be standards for it. Uh. That would be</p>	(DBI), (SA), (ESI)

		<p>central databases. Uh, so. I think we, we would act on equal ground in, in a few years.</p>	
34	Re- search er	<p>See, I see, so and and also interesting to see that how this this type of centralization and these standards that make you know make different ways of collecting data and different ways of calculating it and more creating a a or well. An integrated approach where more or less everyone is on the same page in terms of the way that data is calculated and and collected. So that would also bring a whole other level of transparency or how do you think? Yeah, OK, I see.</p>	

35	P3	<p>Yeah, it definitely would because then, then everybody could trust the data and then everybody has more or less the same processes that, that collects the data and, and that means that I think. And also I think if, if we have a central governance of, of these data, if I produce a product A and and I have 10 competitors in the world producing the same and it's more or less the same raw material going into this.</p> <p>Then our carbon footprint data should be more or less equal. And so I think there would be some validation. Of course our manufacturing processes could be different meaning there would be variances, but I think we would we would reach a level where, where yeah, the validity of data is actually to be trusted, because so many companies are participating in in a program where they deliver data and then.</p> <p>Would just be a central organization that validates the data and, and so on so that that would for sure.</p>	(DTV)
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Appendix 5: Interview With P4

Line	Person	Content	Code
1	Researcher	Yeah. OK. Well, to kick off our conversation, we would like to hear a little bit about your background and experience related to the research topic. So could you please tell us about yourself and your involvement or interest in green information systems?	
2	P4	Yeah, sure. But I think we have to clarify what you exactly mean with green information systems before I can answer that. What is the, what is the scope, the definition?	
3	Researcher	<p>Yeah, sure. I mean, I, I would, if you don't mind, Heba. I'll. I'll just give a short explainer.</p> <p>OK. Well, green information systems in our study is something we perceive as information systems that are used to contribute to environmental sustainability basically. So that could range from everything that enables efficient manufacturing processes that decrease the environmental impact of such processes, or they could also be environmental and carbon management systems where they collect data around environmental performance.</p> <p>Calculate the carbon footprint and integrate that into reporting in an automatic and, and cost effective way. So there there are many different types of great information systems out there, so I don't know if this resonates with you or.</p>	

4	P4	<p>Hmm, yeah, sure, so we are. I mean, I've been working in the financial industry for, for a number of years, primarily in the investment banking side and, and now in IR for the last two years approximately I think.</p> <p>What we've seen is to rise to prominence of the whole sustainability agenda also for financial institutions, so it has really come into.</p> <p>Play your into being a part of, of the processes and, and decision making.</p> <p>And that is because the financial industry.</p> <p>You know, is a vehicle of change, because if you want to enable the green transformation then you need a huge amount of capital.</p> <p>And one way to, to provide that capital to do a green transformation or to a carbon neutral transformation that would be to, to waste that amount of capital and that that, that is where the banking system can help because we raise financing on our own balance sheet. That's the lending. Then we have our capital markets, investment banking where raise equity or bonds on behalf of the issuers, the customers. So there could be.</p> <p>Yeah, just, you know, customer bonds.</p> <p>And also borrowing money from the banks and then of course, they have their equity. So that that's why the bank, banking system plays a crucial role in the green transformation, because you need to finance it and that's what we call the power of finance.</p> <p>So, so we as an institution where much welcome that, and that is really also an opportunity for the banks and for the banking system to have a meaningful role in the society post, you know, the global financial crisis in the early 2010's, where, where the banking system got a lot of criticism.</p> <p>Uhm...so I think all major Nordic European U.S. banks.</p> <p>A really participating in viewing this favorably as a huge.</p> <p>Business opportunity in order to all these financing, you can basically earn a lot of money on raising it. And then secondly also you know enabling the green transformation.</p> <p>And then there is of course all the reporting, all the really, Ins and outs technicalities of that but, but that's not the that's a kind of a add-on effect. You could say. So that's more.</p> <p>It follows from the other.</p>	(RFIG T)
5	Re-searcher	Hmm.	
6	P4	Was it something like that. Is that what you were querying or?	

7	Re-searcher	Yeah, exactly. We, we just wanted to hear a bit about your background within well finance and and sustainability and possibly also a bit of this environmental reporting as well as the, the ins and out...ins and outs. So that, that was what we're looking for, it kind of brings me to my next question because we were thinking of our overarching topic of sustainability. We're thinking of your perception because you've already talked a little about banks taking responsibility posts.	
8	P4	Yeah.	
9	P4	Hmm.	
10	Re-searcher	2008 and financial crisis and more responsible lending and asset management and, and I think just as basic starting point. So how how do you perceive environmental sustainability? How would you define it?	
11	P4	As a financial institution?	
12	Re-searcher	Yeah. Yeah, exactly.	

13	P4	<p>Or yeah.</p> <p>Well, I think that's a pretty broad question, but how we as a financial institution</p> <p>Define it, basically that we, we are committed to reducing, the carbon footprint of our lending, of our investing and of our own operations.</p> <p>So so we we.</p> <p>Of course, our own operations that means to lower our heat bill and but it's very.</p> <p>There's not that much. It will not have a big impact, but given that that just our company's balance sheet is some 500-900 billion DKK in lending, if you exclude the mortgage book.</p> <p>Then we can really make a big impact in terms of our lending, helping our customers transition, helping our customers move. Towards a carbon neutral future.</p> <p>And then in our investment, so that's our asset management.</p> <p>And.</p> <p>Yeah, by facilitating the same kind of change by facing out investments or in that way notching..uhm, our portfolio companies too.</p> <p>To move to be more green.</p> <p>And little bit the same to the funds we raise on behalf of the customers. So for instance, the customer example, raising bonds that we help with, you know green bonds, green loans.</p> <p>And, and green products in that space. So, basically that we, we exclude ourselves gradually from financing, fossil fuels, for instance, we exclude ourselves from fossil financing, upstream oil and gas exploration. We exclude ourselves from coal..umh, and also in agriculture we, we gradually participate in, in the government's efforts too make the environment more or did the agricultural sector more green, for instance, and, and...so that's, I would say that's the approach the bank has has taken.</p>	
14	Re-searcher	<p>OK.</p> <p>Interesting.</p>	
15	P4	<p>So, also responsible investments, and that goes also into the broader sustainability. So there's one thing is the carbon, then you have your supplier, you have the more soft things like gender equality, diversity and inclusion, all of these things, but of course, the climate action. The climate thing is of course the kind of the, the most evident one.</p> <p>Yeah.</p>	

16	Re-searcher	<p>Yeah yeah, I think you are talking into a very current issue, that climate change is becoming more and more, more pressing issue with new report being released from the IPCC and other status updates.</p> <p>However, if, if we move back to well at bit of a tricky dilemma, one could say because already you've mentioned it, a lot of win win situations where financial institutions stand to gain from jumping on the train of environmental transformation and financing sustainable funds.</p>	
17	P4	Hmm.	
18	Re-searcher	<p>And, and loans because they get the financing.</p> <p>What should you say, that revenue from the clients? Yeah.</p>	
19	P4	<p>Yeah. Yeah. So you get the volume, I mean, so the bank is basically earning money on, on lending money out and arranging financing.</p> <p>So that's more investment banking, but.</p> <p>So if if you get volume, if we get lending growth then dissected then, this is the business of banks. That's since the Italian motion banks and something uhhh...2017, so that's the whole capitalism banks transform people who have surplus cash and transform that money to those who need it for investments, and that's the kind of the cycle of, of capitalism in audutive banking system that we have in the, the Western world. So, and in that space of course balancing the green transition is something that we take very, very seriously and you know, deeply committed to.</p>	(GTC)
20	Re-searcher	<p>I see. I see. So, um, moving from these win win situations, which are often present, and our previous interviewees, has also often talked about there being a, a synergy or an overlap between business value for, for example financial institutions and environmental performance they, they kind of contribute to one another. But in other situations they might actually be at odds that they might engage in a trade off relationship. Is this something you have encountered as well?</p>	
21	P4	<p>Hmm, can you explain it a bit more what you mean by trade off? So yeah, just to try to answer precisely, that's more my mission.</p>	
22	Re-searcher	<p>Well, yeah, sure..well, um, for example, another interviewee, we talked to working at another bank, a Swedish bank. She mentioned that, for example, their exclusion policies toward oil</p>	

		and fossil fuel companies and, and petrol, petrochemical companies.	
23	P4	Hmm.	
24	Researcher	It was a double edged sword in a way, because there are perhaps some industries out there that are not very environmentally sustainable, but they're very lucrative. They, they do have pretty good rates of return. But then again, environmental performance is hampered there. So, it's just thinking along those lines.	
25	P4	Yeah. Yeah, no, definitely, we, we fully recognize that. And then that is one of the big dilemmas of this as a society and for the financial industry and for our company, as well. So what, what you can see is that...I mean, our whole society is based, for instance, on fossil fuels, so everything in plastic, and I mean in our furniture, in our food production and all of that. I mean so, so this needs to be a gradual chains, but we are in a kind of hurry also, and that means that. That's why our company and also other Nordic financial institution, is taking the approach of being we are relationship lender so, we engage with our big corporate customers to help them transform. Because we could, we could stop lending to, to somebody in, in some. We could call it a blackish industry, but what would that help? Then, they would need to go somewhere else to find that same financing or some Chinese company. I mean. So what, what we want to do is to help reduce the CO2 emission, and to get to 0, target by 2030. And and the only way we can do that is to help the society, buy the companies in the economy to transform, doesn't make sense. Do you see what I mean? That means that, that you have all these blackish also in the Nordic region where..yeah, yeah, we can kick them out. But first of all, it's people who are having a job and having a paying taxes, which means that everything runs and many of the products are something we need. So for instance, many medicines that they are fully covered in all kinds of not very sustainable packaging, but you still need medicine. And so there's just a huge amount of dilemmas where you need to transform gradually. Even though, as I said, we are pretty much in a hurry. So, and we have a lot of those customers in, in, in the bank where we engage with them. We said what do we call a transition plan to net zero and then we finance the net Zero transition plan, so we helped our customers transition. We do, we don't.	(EFT)

26	P4	<p>Yeah, It is easy we could, we could be carbon neutral if we kicked out all customers that emit we are a carbon neutral as a bank, but they still emit carbon, just financed by somebody else. And that's not very productive. But..and then you have it the second trade off that you that you talk about that is the, so when, when you guys have a pension or, you have for your own account you buy a share in the bank you expect a return. That is above the the risk, you're taking by buying that share or come also compared to other equity investments you could do. So our investors they want a return, so and that's the second the bank exists for many reason, but to earn shareholder profit because otherwise they wouldn't give us their capital then they would put their capital somewhere else. So it means we cannot, also, we also have an obligation to, to earn a return on, on the shareholders equity.</p>	(SRES)
27	Re-searcher	Yeah.	
28	P4	<p>Hey, and that means again also that there's a dilemma if you just said OK, well, this company they emit. So let's kick them out. Yes, but we still need to, to earn return on our shareholders equity, otherwise the shareholders will not provide us with their capital and then there will not be a banking institution and so that and that will become a problem for the society, so. So there's really, as you say, very much about the transition financing the transition, moving the needle. Gradually, but still mindful that we are actually in a hurry because as you mentioned yourself, the reports coming out of the UN and also I think people can just look out of the window and see, I mean southern Europe, it hasn't rained for and you know all these bit anecdotal evidence but still. And you kind of see, and it might have other reasons and you could debate, but it it still seems. Although anecdotal, but still, it seems that the climate is actually changing, so we are in a bit of a hurry in that sense.</p>	(CCU)
29	Re-searcher	<p>Absolutely. Yeah. So I think what you talked about is, well, a lot of a lot of it relates to this, these difficult dilemmas between you know realizing shareholder, shareholder returns versus also doing, you know, the sustainable transition and you know better to do it in a hurry or better to do it in a slight or hurry I guess because it is becoming a bit more urgent as you said. So a lot of companies, they try to use green information systems to tackle this challenge, if not to use it directly in their sustainability initiatives, then to use it indirectly through monitoring their environmental performance with these. With these systems with for</p>	

		example, using sensors to collect data about generated waste or or output or.	
30	P4	Yep.	
31	Re-searcher	Greenhouse gas emissions and whatnot. And, and I guess a lot of companies do this to gain an overview, but I'm thinking in terms of your perspective, do you see any other benefits or or what do the benefits look like to you when using such reporting systems and monitoring systems?	
32	P4	<p>I think that that clear benefits you need to the whole thing about this. You need to enable this transition</p> <p>And how do you then measure the transition?</p> <p>And that's where I guess the green information systems come into play because you need to be able to measure it in a credible and trustworthy and and accurate way. So you need, and that there you can imagine all kinds of depending on the industry if it's a.</p> <p>As some production company of its more retail company of or if it's a consulting company, but you need to be able to measure. How that company is transitioning to to a green net green or net zero future, and I think that that we need to be able to to measure.</p> <p>And also real estate, how much the does our buildings emit?</p> <p>All that you need all kinds of sensors and data, and, you need trustworthy data.Hmm.</p>	(IMT)
33	Re-searcher	Maybe even the category of production efficiency systems that information systems that optimize resource use for production, for example cutting raw materials into resource efficient shapes so that there's the minimum amount of waste generated possible. So those are, have pretty clear business benefits, but some of the harder or more tricky implementations of green information systems are these transformative green information systems as we like to call them.	
34	P4	Yeah	

35	Re-searcher	<p>So these enable completely new business models such As for example circular business models that are enabled by, you know, platform economy for example that for example, there is a company doing a trades in.Model for, you know, old models of that used electronic equipment or smartphones and they get this kind of cash back reward or something similar. So they're trying to close the resource loop in a way. And I think these are trickier to, or research points towards that, these are, are trickier, more large scale because the effect the very business model as well. So I'm thinking in terms of benefits for that one, if do see some similarities or, or do you see a completely different picture?</p>	
36	P4	<p>And..now I think when, when we as a financial institution help our customers transition and finance their transition, transition, then that is where something like this will be very..so we have to go through a credit approval before we can lend out money and sustainability is an increasingly..so you have all the financial metrics and the leadership and all kinds of in a credit decision. But now sustainability metrics are also coming into being a part of the credit approval decision before lending and in that respect, that will be very important for financial institutions to have as you say, green information systems in, because that will be an enabler of actually doing a transition in a company that you're able to measure and control and execute on actually transitioning.</p> <p>Yeah. Was that what you were thinking about or something else?</p>	(SMC A)
37	Re-searcher	<p>No, that was good. So moving from benefits because we've talked about benefits quite extensively. But in terms of risks and costs with these initiatives, are there any risks you see as a financial institution in implementing such green information systems? Maybe just the monitoring systems we could work with for now?</p>	

38	P4	<p>Yeah, I think there's a number of things that we're very mindful about. And that is you could call it greenwashing. But you can imagine that if the information is corrupt or wrong or inaccurate, then you can think you are financing a green transformation or transition. But in effect, you are not because the data or the measurement control the oversight. So we have a lending portfolio of in total, it's 1.8 trillion, that's including everything, but trillion corona, right? So how do we measure and ensure that when we say we transition, we have asset under management for half a trillion or 800 billion corona, when we say we want to be a green asset manager and responsible and all that, but you still have to measure it. It's a single portfolio company. And all of that oversight, there are the green information systems to reporting the data, the SDFR, the disclosure requirements will become hugely important so that you avoid some kind of greenwashing scenario, because you will have to be able to prove like, for instance, the financial figures today that if you say your net revenue is XYZ, then the auditor, the independent auditor, has signed off on that the revenue is actually that. And that's the progress that where we are moving as a society and as a European Union and so on to do that. And that is of course, it's a risk, because do we manage to get all of these things up and running in a sufficient quality? Because again, the thing that this is about is moving the needle. If we don't emit less CO2 or the greenhouse gasses, then it doesn't matter. The nature doesn't care what we report or what we, I mean, that doesn't matter. The only thing that matters is that we actually make a difference in the environment or in the climate, if you talk only about climate. So we can report and write all kinds of fancy texts and reports and the PowerPoint slides, but it doesn't move the needle.</p>	(GC), (DAV)
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39	P4	<p>So the risk is definitely that we don't, as a society and institution and regulatory framework, that it really enables the transition. And then of course, it is a cost. So you can see, if you have a small company, you are, you have a retail, you're selling pizzas and some kind of little village or you have two taxis and starting to disclose reports. So the bank will say, we need, we can only finance people who are on a net zero transition plan and all that. The taxi company, the pizza baker, how did, and also a small company with like 30 employees selling some kind of specialized product, should they start to hire a person doing all that in order for them to get a loan? Or you can see, this is very costly for, of course, Customer, they can make a huge department doing this, but and hire consultants, but, and that's where also the banks, we are committed to in our business banking segment, to help the smaller customers get this right. Because the smaller customers, they are also hugely important for the economy. Unemployment and they create hundreds of thousands of jobs. So we still need the jobs, right? So we also want to transition, but it is really, and you still need to eat pizza to use that example, even though that we know that probably the climate would be better off if you didn't make all these pizza boxes or pizza. So, and then the last thing is that, of course, there's also, you can see Texas taking a very vocal stance in the United States, that they're actually going against many of these things and saying that it will just kill the economy. It will not make a difference in reality. And, and, and so on. So you can also see this. There's also a trend in when you go outside North America, and you go outside Europe, and you go outside certain parts of Asia, where all of this is people don't speak so much about it. And it's, it's, there's a completely different view on many of these things. And that's, of course, also a big risk that we might be doing a lot of things in Europe and in certain parts of the United States and so on. But I mean, if China just continues whatever they do, it might not really matter in the end. So, so we impose a huge cost on our own economy and our own, it's an implicit attacks, you could call it a kind of climate tax.</p>	
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40	P4	And it is just, we're not competitive. I mean, if our consumers just instead of buying a locally produced thing or something, then they just buy it somewhere else, then yeah. So, so that's, that's a range of risks, but, but I don't think we have any choice. So we have to, we have to do this. And it's the, it's the only thing that's meaningful to do in that sense. So, yeah.	
41	Re-searcher	Absolutely. Yeah. So I see, I see your points of, you know, increased costs of, you know, pricing in these greenhouse gas effects into their products and into their offerings for different companies. And also the reporting burden that's also expensive for SMEs, which are, well, a large part of the economy within the EU and I guess worldwide as well.	
42	P4	And then yes, of course, the risk that we basically attacks our global competitiveness. I mean, we need this to be global basically, because otherwise we're risking of, it could be at least be allowed products become uncompetitive. less competitive at least.	
43	Re-searcher	So less green sectors outside of these green areas could undercut our prices basically with less sustainable practices. I see. Okay.	
44	P4	Yeah. Yeah	
45	Re-searcher	So I think we have had a quite good discussion of risks so far. But in terms of investing and in terms of lending money to companies, there is an entire decision process going behind that decision of how much to lend and under what terms and also in terms of financing. There are a number of factors that go into the equation of, you know, weighing pros and cons for a certain company or for a certain portfolio, et cetera. So you mentioned sustainability becoming an increasingly big factor here, but how does this factor look like more specifically? Or are there any other factors? Well, there are other factors, but what do the other factors look like as well?	

46	P4	<p>Yeah, so yeah, I totally agree to that point. So as a financial institution, our biggest impact area is the lending. So the money we lend to customers, then our second biggest impact area is our asset management. So the investments we make on behalf of our customers.</p> <p>The lending is by far the most important and that's also what you would call scope free in kind of the sustainability term. So before we can lend from our own balance sheet, there needs to be a credit approval that would guide us if it's you borrowing or buying a house or it's a small company investing in a new capex or if it's Vattenfall, you know, doing a huge M&A transaction. The credit approval is based on a lot of financials. So the accounting performance, financial performance of the company and then it's also based on things like history and track record and operational risk, compliance with laws and stuff like that. But then it is also based on sustainability metrics. So that's both the, you could call it the climate related things, CO2 emission, but also the broader sustainability.</p>	(SLD)
47	P4	<p>So something like DNI and compliance and adherence to gender equality and other sustainability factors.</p> <p>So employees, code of conducts and so on. So our company as an institution, for instance, would not lend necessarily to a company that was breaching the laws or were engaged in illegal activities or operating in sanctions. So that's compliance with sanctions and so on.</p> <p>So that's basically the factors and sustainability is definitely becoming a much more crucial factor in those credit decisions. So if the company is an emitter of CO2 in some sense that it needs to, then we have set reduction targets for our lending book as a total. So in order to reach those reduction targets, then the companies we lend to, they need to reduce their CO2 emissions. So for those who are large emitters, you can call it, then those companies need to present a transition plan to be able to borrow money. Because what we think about is the, so we don't limit a lot of CO2 ourselves as an institution, but the lending we do are financed emissions. That's huge. We are a shipping bank. We used to be an oil and gas bank in Norway, something like power generation. We have cement a little bit, that's primarily in</p>	(SLD)

		Denmark, but then you have the whole real estate portfolio. So we finance the last part of the, in Norway and Sweden and Finland and Denmark, the people's houses, which emit a lot of CO2 basically for heating and stuff like that.	
48	P4	<p>So in order to reach our decarbonation targets and then reduction targets, then our lending book needs to, so that's why it becomes increasingly important. And then the last thing is climate risks, which is also coming into the credit approval process, meaning that is the company placed in a place that will be flooded, will there be drought or any climate risk related factors that might mean that we will then take an impairment, i.e. a loan loss.</p> <p>So that's basically the overall, then the asset management. So we invest on behalf of our customers who have pension or other. And there we have set reduction targets for our investment products, so all our mutual funds products and asset under management.</p> <p>So we set the reduction targets in our investments and then we engage with these. So for instance, if we have a mutual fund, something called European equities, and then in that fund we have a company in Spain that emits a lot of carbon, then we engage with that emitter to be able to reach our reduction targets for the carbon intensity of our investment products. So that's active ownership in that sense.</p>	(RMC R)

49	Re-searcher	<p>Okay, interesting. So well, I think this active ownership debate or active ownership concept really relates to, I guess, private equity and asset management, but in a way it's also has a similar parallel in lending as well, especially for big lenders if you understood it correctly. So I'm thinking in terms of these climate transition plans that you ask these large emitters to do when lending to them or financing them with either loans or private equity. Does reporting systems play a big role in these transition plans or are they more of what should you say, manufacturing process changes you're talking about? Or are there also reporting changes you talk with these companies about if that question makes sense?</p>	
50	P4	<p>It definitely makes sense. I mean, they become hugely important because we need to measure our financed emissions. So we need to measure our scope 3, and how do we do that? So we need to measure the emissions coming from our lending portfolio. And that will then depend on that specific customer company being able to report in a credible way how much they are emitting today and then tomorrow and so on. And that's why the whole reporting measurement data thing becomes really important because if the underlying data and that data that we get as a financial institution is wrong, is inaccurate, is, you know, we won't move the needle in the real world. Because again, it doesn't, again, of course, we need to measure and do all of this in PowerPoint and do it in Excel and all of that. But in what matters and what will stop climate change is that we actually reduce greenhouse gases in the atmosphere. And so if we think we reduce, but reality doesn't because there's a lot of mythology and all of that. And that's why we're also committed to the science-based targets. So that we, you know, building on science for what we need to achieve, but also in terms of measurement and all that.</p>	(IAR)
51	Re-searcher	<p>Yeah, so I guess the science-based methods, they rely a lot on data then. And just to clarify, so by science-based approaches, does that imply that the Paris</p>	

		Agreement is the main target goal for such a type of approach?	
52	P4	Yeah, we signed up to all the climate, the Paris Agreement and committed to the science-based targets and set by 2030. Our reduction targets are set by 2030 to achieve the Paris-aligned targets by 2030 or earlier, of course, we can get earlier.	
53	Re-searcher	Yeah, yeah. Okay, thanks for clarifying. So I see that our time for the meeting is approaching its end, but just a final question here. So in terms of the investor perspective, because The company has a lot of asset management and private equity operations. So a lot of times investors appraise the value of, for example, initiatives or organizations based on traditional methods such as discounted cash flow techniques or net present value methods, where they take these financial aspects such as future revenue and future profits and discount them based on a return rate. But the benefits from green information systems such as monitoring and reporting and gaining increased control and information over your processes as a company, these benefits are often non-financial in nature. They're hard to quantify in crowds or hard to quantify in a currency. So that might make it a bit difficult for investors to value these types of initiatives in an accurate way, if that makes sense. So how do you see investors approaching this challenge? Are there any steps to take here?	
54	P4	Definitely. So what you see is, for instance, both investors, but also sell side research. So the investment banks that issue equity research, they have included sustainability factors. So they do the DCF. So for instance, let's take a big Nordic asset manager, also our own our company asset management. So they have the hardcore figures, the DCF, the NPV and all of that. But then alongside that, you have the sustainability score or metrics. So when they go to the investment committee, then you need to have the return, the hardcore financials, but then you also need to adhere to all the sustainability targets, responsible investments, the net zero asset managers, targets and climate risks. So that goes into when the investment committee needs to	(ISFI D)

		<p>approve the mandate for the portfolio manager to invest. That definitely plays into that. You can see also, you have what you call ESG ratings. So I think actually that ESG sustainability is becoming very much integrated into decision making of the asset management industry.</p>	
55	Re-searcher	<p>Oh, sorry, excuse me. Yeah, but yeah, so they're gaining in importance, but it's still in an ongoing process. There is still some work to do in the financial sector in general, if I understood it correctly, or how's your perspective?</p>	
56	P4	<p>No, no, but you know, yeah, I mean, there's a ton of work to do everywhere, right? We fully support all the regulation because I can kind of like accelerate all of that. But it's so much to do. We're not there yet, not as a society, not as a financial industry, and not as consumers. And so there's still a huge journey to actually reach the net zero targets, because it is a transformation. It is a transition. But all that, I mean,</p> <p>Our company as an institution, alongside other Nordic and European asset managers, fully support this and have signed up to the relevant principles and integrated into the decision making.</p> <p>So yeah, so we need to reduce the carbon intensity of our investment products in our asset management business. And we're fully committed to do that by, yeah, I think it's 50% by 2030. And then the one way to do that is exactly as you say, yes, one thing is the DCF, one thing is a short term profit, all of that. But the second thing is reaching actually the both the broader ESG things like D&I and supply chain, compliance with laws, sanctions on that.</p> <p>And then also, of course, the pure climate related things, i.e. carbon neutrality.</p>	(ACC P)
57	Re-searcher	<p>Okay. Well, yeah, thanks. So I think this has been some really good input so far. So I guess this concludes the last interview question for us.</p>	

Appendix 6: Interview With P5

Line	Person	Content	Code
1	Heba	Perfect. Good. So, now we would, to kick off our conversation, we would really like to hear a little about... about your background and experience related to the research topic. Could you please tell us about yourself and your involvement or interest in green information systems?	-
2	P5	Okay. Yes. Of course. So, about my background... So I'm currently a student. I'm in my fourth year of study. I studied finance in [redacted], and during my studies I had the opportunity to go two years abroad. I went one year in Montréal where I met Valdemar and one semester in [redacted]	-
3	P5	and now I'm doing a six-month internship in a kind of investment bank in [redacted] where I work in the financial risk department, and my goal is to make sure that all of the results of the bank is not exposed to any financial risk. Uhm, yeah, that's it.	Risk reduction
4	Valdemar	Okay. Cool. Well, that's really what... the profile we've been looking for... for and uh... so it's super useful to have someone who knows the practical stuff within finance and investment, especially investments, so that's really good to hear.	-
5	Valdemar	So I guess just to kind of kick off our conversation around sustainability, I guess, I would just like to ask you, how do... how do you perceive environmental sustainability? How would you define it in your opinion?	-
6	P5	Just to... just to make sure, can you just define exactly what you consider as environmental?	-
7	Valdemar	Yeah, sure.	-
8	P5	Just to make sure.	-

9	Valde-mar	Absolutely. By environmental sustainability, I mean... or we mean that, you know, based on environmental factors such as climate change, pollution, natural resources, et cetera, business practices and societies today need to balance the needs of everybody today and the needs of future generations. So basically this long-term sustainable development. If that makes sense.	-
10	P5	Yeah, of course.	-
11	Valde-mar	Okay. I see.	-
12	P5	Yeah. Okay. Yes. For me, I think it's a really important topic because, uh, as you know, we are really dealing with like, say, climate change and everything, so yeah, I think it's like a very important topic,	Environmental sustainability
13	P5	and it's also something that, like... it's good to, how to say, sorry, it's a long time I haven't spoken English.	-
14	Valde-mar	No worries. Take your time	-
15	P5	But like, it's good that, now, now more of people are concerned about this. But I think that is not enough, like a lot of companies don't really care about this and also have the feeling that a minority of people take care about the environment, but this is not enough in comparison to like the majority or like the big company, or... yes.	Strong sustainability
16	Valde-mar	I see. I see. Yeah. So there's definitely, you know... uh, some laggards among the companies, I guess, as well as you mentioned.	-

17	Valde-mar	And I guess some of that sometimes boils down to the question of... I guess, financial returns and profits versus... well, sustainability initiatives that might have a bit of a tricky relationship. There might be a bit of a tricky relationship between the two at times because sometimes they engage in this type of trade-off relationship where one gains and the other does not, or the other way around. So I'm just thinking in terms of... of your opinion on how to approach this type of challenge. Do you see many situations where these conflict against each other?	-
18	P5	Yeah, of course. Like, I know that now, for example, in the companies that I work, so now, they're starting to invest a lot in some funds or some assets that has some ESG label.	Types of investors
19	P5	Like, they really want to... yeah, participate and trying to find a good way to make money and investing in funds where they can like have a good positive impact on the environment.	Synergies
20	P5	Also, sometimes I think that some companies did this just for the image, like they do this: "Yeah, okay. We invest in bad assets, but on the other hand, we also invested in some ESGs, so we have a nice brand image."	Greenwashing
21	Valde-mar	I see. So it's a bit of a facade, one could say.	-
22	P5	Yeah, exactly.	-
23	Valde-mar	I see. Interesting. But on the other hand, a lot of companies see very... very big benefits in terms of adopting sustainability initiatives, and especially using information systems and digital technologies with these sustainability initiatives. And they see big benefits not only in terms of environmental performance, but also in terms of organizational performance, you know, improved brand image or improved profits even with the... I guess, resource savings and cost savings if they use more energy efficient processes, et cetera.	-

24	Valde-mar	So I was just thinking, well, these are just some of my examples, but I was thinking if you had any other ideas or opinions on synergies between environmental sustainability and profits... if they go hand in hand at... in some points?	-
25	P5	Yeah, if I think about it, one... so four years ago, I did an internship in an accounting firm, and in that firm, everything was under real paper, they were printing like so much during the whole day, the printing machine was working, and working, and working, and working. And so now, they decide to, one year ago, something like that, to all digitalize and all the papers like to be numerical, everything to be under digitalization, and so they told me now they can save a lot of money by... without printing, because it was... I don't know, thousands and thousands and thousands of papers per day. And now, it doesn't cost a lot, it's just all under electric on their computer.	Synergies, eco-effectiveness
26	P5	So yeah, by this example, I think it's a nice example of how this company saves a bit of money, and also, on the other hand, make a good... not a good action, but try to not really decrease the environment.	Synergies
27	Valde-mar	Yeah, making a good impact, yeah, definitely, definitely. So I think you kind of already answered one of our next interview questions, which was about where companies are today in terms of sustainability and where you think they should be, but I guess in your opinion, as I understood it, they kind of lag a pretty far bit behind.	-
28	P5	Yeah, exactly, I think they start to do some, some, but it's maybe not enough.	Strong sustainability

29	Valdemar	I see, I see, although the companies that... that are doing some more initiatives in terms of environmental sustainability, a lot of them use digital solutions and information systems to achieve this environmental performance on a commercial level, like in a profitable way that, that still works with bus-... business.	-
30	Valdemar	So one example might be monitoring systems where they collect a lot of data regarding environmental data, greenhouse gas emissions, etc. They calculate the carbon footprint, which is a pretty complex operation as well, which these systems automate in a... in a way, and then they use that for reporting as well, and they can make this data verifiable by pointing to where was this carbon footprint evaluation sourced from? Like what data was its source? And even using sensors as well. That could also make automatic readings even less error-prone, I guess. So I'm just thinking in terms of your perspective, what kind of benefits do you see in using such systems? In your opinion?	-
31	P5	Uh... For this question, because I'm just not really used to... about everything which is about this kind of informatic system... just what is it exactly about?	-
32	Valdemar	Yeah, sure. So it's an environmental and carbon management system, which is often used for reporting in sustainability reporting. So it, uh, aggregates a lot of environmental data, such as greenhouse gas emissions for, you know, transactions or individual products, and then aggregates them on a higher level to calculate the footprints for sustainability reports, basically.	-
33	P5	Okay. But how could you say how the companies use it exactly... Is it like?	-
34	Valdemar	Well, that's a big question... *Valdemar chuckles*	-

35	Valdemar	Because the systems involve a lot of data collection processes at every transaction, and they involve suppliers having to provide sustainability data for their products.	-
36	Valdemar	So for example, if you buy raw materials from a company, they have to supply that information of carbon emissions associated with that product, or raw materials, sorry.	-
37	P5	Yeah, okay.	-
38	Valdemar	If that makes more sense.	-
39	P5	Thank you. I think using this can also be nice because, then, the company can have an idea of their impacts, their impact that... that they do, and can also be a big source of information to which... where they can improve or what is the major parts of their business to be improved in order to have a positive impact, like that they can have a range and have a better idea. Okay. If I understood well, what is it about?	Informato, quantitative environmental performance
40	Valdemar	No, but that... that's super interesting, and that's also very... it corresponds a lot with what other interviewees have said previously as well. They also see these benefits of, you know, a better overview of which parts of the company and business areas that do well in terms of sustainability, and which might not do as well in terms of sustainability.	-
41	Valdemar	But I guess a lot of companies also see risks and costs connected with implementing such systems because they might be error prone. They might need a lot of manual work and manual typing in of data and punching in the numbers manually. And also costs in terms of changing business processes, buying sensors and infrastructure, and all the data collection practices associated with it.	-
42	Valdemar	I mean, just thinking from your perspective, what types of risks or costs do you see in your opinion?	-

43	P5	So, in my opinion, kind of risk... so, hmm... maybe like as you say, maybe I think the riskier part might be like some error or like some... more technical part that may be difficult to implement, and maybe this can lead to some risk, the fact like...	Green IS risks
44	P5	I don't know, it might need a lot of resources to implement,	Short-term costs
45	P5	and maybe this can lead to a lot of error. So I think this is a major risk.	Green IS risks, data quality
46	Valdemar	Hmm, I see. I see. Okay. Interesting.	-
47	P5	That's why I don't know how it works exactly,	High-level information
48	P5	but like maybe the lake of data can also be a problem because if there is, I don't really know how it works, but like if there is, I don't know, maybe hundreds of transactional days... and like maybe this will not have like a proper representative of the system, and maybe it will not be... like not have a nice conclusion.	Green IS risks, data consolidation
49	Valdemar	No, I see. So, if I understood it correctly, I just want to double check that, you know, the large amounts of data generated, they, they need a lot of computing power, and...	-
50	P5	Yeah, exactly.	-
51	Valdemar	Okay, I see. Because that's also an issue that there has to be the right infrastructure for it to store the data, to process it on such a large scale... so definitely.	-

52	Valde-mar	So I guess to well... uh, move a bit from the risk aspect of using these systems, etc. We were thinking in terms of the investment process or the investor's perspective on this because when investors decide to invest or, or actively engage with companies and try to influence them or maybe not invest in them... we're thinking in terms of what factors influence these decisions related to the things we talked about earlier, if that... that makes sense?	-
53	P5	Yes. Yes. So I think from an investor perspective, like yeah, of course... I think every investor, if they have the choice between investing in two different assets/projects and this thing... and one of these two has a positive impact on their own environment, I'm sure they will invest there. Yeah, for sure. It's always nice to know that the money you invest will contribute to positive projects or positive environmental impacts. So yeah, I think that... that if they have the choice and they know that this investment can also be a benefit for them in terms of return, yeah, I think that, yes, they will invest in them.	Synergies, weak sustainability
54	Valde-mar	I see.	-
55	P5	It just has to have a return because...	Weak sustainability
56	Valde-mar	Yeah, yeah, the return part is also a pretty big... big factor, of course.	-
57	P5	Yeah. Hmm.	-
58	Valde-mar	Yeah, so I guess that kind of speaks to this balanced approach where investors, well, they still look for returns, but also sustainability has become a larger part of the equation.	-
59	P5	*Participant 5 nods* Exactly.	-

60	Valdemar	I see, okay, okay. So I'm just thinking in terms of uh greenwashing, which is becoming an increasingly large topic nowadays, especially within the EU, because one of our previous interviewees said something interesting about a lot of investors actually being victims of greenwashing because they invest in companies that convince them that they're agreeing with all these reports and figures, while the reliability and the verifiability of the numbers, they're maybe not up to the right standard.	-
61	Valdemar	So I'm just wondering in terms of your thoughts on this, like, how critical, in your opinion, are investors usually towards this type of thing?	-
62	P5	Oh yeah, sure. It's like... it shows that sometimes some company can give some not really right information, and this can have an impact on the investor's mind because he will be more able to invest there. Because the fact that he thinks that he makes a good action, but in reality, it's not a good... uh ouai.	Greenwashing, verifiability
63	Valdemar	Oh yeah, okay, I see, I see. So they're led to believe something in a way.	-
64	P5	*Participant 5 nods in agreement*	
65	Valdemar	Yeah, yeah. I see.	-
66	P5	I don't know if there is a solution for this. Maybe, like if there is, I don't know, a company or an association or something that validates this, and like that, say, "yeah, this company has a positive impact for the environment." Like an official company that were like, co-writing the company in terms of environment impact, like maybe with this... with this investor he'll have maybe a nicer, nicer opinion where it's like good... good to invest.	Verifiability, extrinsic signals, standards and certifications

67	Valde-mar	Okay, that's interesting. So like a third party kind of... kind of has a certificate or standard or something?	-
68	P5	Exactly. It's like, for example, like the company that co-writes the bond, like if...like this has, like a high potential of like refund you or not. Kind of the same, but like for the environment.	Verifiability, extrinsic signals, standards and certifications
69	Valde-mar	Okay, right. Well, okay, sorry, I think my audio kind of had a blip there, could you please repeat what type of standard you referred to? It was like something similar to your...	-
70	P5	Yeah, something similar to like, for example, like the bond, like government bond or like corporation bond, like there is like some company, like they make some grade. Like they grade, for example, AA, BB, like, and for example, this will lead to like some potential risk of the creditor to refund you like if he has like, AA, it means that he will refund you like without any problem.	Standards and certifications, extrinsic signals
71	P5	But if it's on like a C, it means that he has some financial difficulty and it will have difficulty to refund you. So kind of the same system like another counterparty will write the company in terms of environment impacts, maybe by using like some environment-digital system. And by using this, maybe the company as an investor will have a nice opinion of where to invest.	Standards and certifications, extrinsic signals
72	Valde-mar	Okay, interesting. So yeah, this... uh, this also kind of corresponds with what some of our interviewees also said that if there's this third party, this trusted third party, as you mentioned, and it's like this centralized, easily accessible information, then it's way easier to compare these different companies in terms of actual performance, I guess.	-
73	P5	*Participant 5 nods*	

74	Valde-mar	Okay, yeah. And as you mentioned, an interesting comparison with credit ratings, these A plus and AA, et cetera. So I guess staying within this financial sphere, so to speak... uhm, investors often use quantitative traditional methods of appraising the value of their investments. So they might use discounted cash flow techniques, they might use net present value techniques to calculate the value of future profits.	-
75	Valde-mar	But the thing about these sustainability initiatives is that they bring a lot of values that are, well, non-financial in a way. They bring these non-financial benefits such as improved reputation or improved uh... environmental performance or, you know, a better overview of their sustainability performance across different business areas, et cetera.	-
76	Valde-mar	So I was just thinking in your opinion, how to approach this challenge of these hard-to-quantify benefits that are non-financial?	-
77	P5	Mhm. Yeah, true. I never really think about that, but yeah, I think when investors are really looking to what they are assessing... okay, yes, they can use some quantitative method, such as the one that you said, but for sure.	Synergies

78	P5	<p>I think it's important to also know all of the other factors that can influence the company as... as you said, for example, how the company is dealing with the environment... if the company is dealing nice or bad, because if a company doesn't really care about the environment, maybe, okay, the NPV is nice and discounted cash flow lead to a conclusion that in the future it will have a positive return. But this is only quantitative method, and also, I think the investor has to also think about other factors that can influence this, and I think, now, the environment, uhm, factor is really something that investors need to consider when they are investing. I think, now, a lot of investors are looking also about some other factors, like for example, whether the company invests... or if the company, uh, has a positive impact on the environment.</p>	Strong sustainability, critical investors
79	Valdemar	<p>I see, yeah, so definitely an increasingly important topic and it's something that's gaining a bit more awareness as I can understand from you. But I'm also thinking in terms of maybe these institutional investors such as fund managers, etc., they have maybe a portfolio of 60, 70, 80 stocks in their portfolio and they... they don't have a lot of time to look through each individual stock because a lot of these quantitative measures, I guess they're good because you can put them in Excel spreadsheets and quickly, you know, rank them based on that. But these non-financial factors that are difficult to quantify, I guess they're a bit trickier to fit into an Excel spreadsheet, so I'm just thinking how detailed are investors in terms of this type of process?</p>	-

80	P5	I guess, but I'm not sure... but I guess now they start to allocate some percentage into some asset that are... has a positive impact on the environment. Like maybe, I'm not sure, but I think, now, it's also a diversification way for the portfolio manager to diversify the risk by maybe investing in some assets that have like good, sustainability impact, but some other assets that also are not, like... I guess now most portfolio has, I don't know, maybe 10% of money invested in ESG assets.	Synergies, weak sustainability, risk reduction
81	Valdemar	Okay, I see. So it's basically a risk management strategy, I can understand as well.	-
82	P5	*Participant 5 nods* Mhm.	-
83	Valdemar	Okay, right, okay. And I guess for these monitoring systems, environmental and carbon management systems where they give management and the organization an overview of where do they emit a lot of greenhouse gasses, et cetera, and these efficiency technologies where they do energy efficient production processes, I guess they have pretty clear benefits so far, I guess, as we've talked about.	-
84	Valdemar	But there are also this other class of green information systems that are a bit more transformative that enable these completely new business models that would not have been possible otherwise without digital technologies such as, for example, circular business models that are enabled by digital technologies.	-

85	Valde-mar	Such as these buyback programs from Apple, for example, where they announced that. They announced that they could buy back old devices to improve recycling and use this digital platform to make it easy for the customer to interact and also to get a quick evaluation of how much their old phone would be worth. So when... while this idea might sound nice on paper... well, it did to me, an article from 2017 found that the stock price dropped quite significantly upon that announcement. Uhm... So I'm just thinking in terms of your... your take on this, what's your take on the stock price dropping upon this announcement?	-
86	P5	Uhm. What do you mean exactly? So the fact that after the announcement... I didn't really catch what you were saying...	-
87	Valde-mar	Yeah. No, sure. It's just another example of a green information system where I think it was Apple who announced that they would start buying back old devices and in exchange for gift cards to Apple Store so as to promote recycling and, and reduce electronic waste.	-
88	Valde-mar	And while this would, you know, improve their environmental performance, when they announced that they would offer this to the press and to investors, the stock price dropped quite significantly when they did that.	-
89	P5	Okay. Yeah.	-
90	Valde-mar	Yeah.	-

91	P5	Okay, okay. Yeah. Yeah, I think it's maybe because it's some investor, like they really just think about their money and so they're afraid that if Google do this, like maybe like, I don't know... but I think like most of the investors, like they just invest because they want to make money, and so like, they maybe prefer to like invest in like some assets that they are sure that they will earn money instead of investing in like asset that have a positive impact, but they're not 100 % sure. So maybe this is what happened, like some investors were afraid of the fact that Apple did this, maybe Apple would like invest so much money, and I really don't know, but I'm just maybe guessing that, that's why.	Green IS risks, weak sustainability
92	Valdemar	No, but the guess is... that's what we're really interested in. So that's... that's good input, we think. So yeah, because again, this, this is the risk perspective, I guess, because these, these you know, very new and very cutting edge technologies, such as that one was at the time that was, well... I guess a bit risky for a lot of investors, and, and that... and I... if I understood you right. And then, then that's kind of the reason that the stock dropped because the risk rose so much.	-
93	P5	Exactly.	-
94	Valdemar	I see, I see. And you... and is this something that is commonly known, uhm, to happen for, you know, green announcements when companies do green announcements or, or, you know, technology announcements, et cetera, in your experience? Does this usually happen?	-
95	P5	Yeah, I never seen like something like that. Like for this question I don't really can answer.	-
96	Valdemar	OK, yeah...	-
97	P5	I don't... I don't have an example like this.	-

Appendix 7: Interview With P6

Line	Person	Content	Code
1	Heba	To kick off our conversation, we'd like to hear a little bit about your background and experience related to the research topic. Could you please tell us about yourself and your involvement or interest in green information systems?	-
2	P6	Uhm... *Participant 6 chuckles* I think maybe you could start by clarifying to me what's the difference between green information systems and general information systems in this context.	-
3	Valdemar	Yeah, sure. Just before... if you don't mind? *Valdemar looks towards Heba* I could give you an explanation. Is my audio clear, by the way?	-
4	P6	Yeah, you're not as loud as your colleague, but I'll turn on the volume... There yeah.	-
5	Valdemar	I'll just move a little bit closer. Okay, how about now?	-
6	P6	Yeah, that's fine.	-
7	Valdemar	Okay, perfect. So I'm just thinking in terms of your question of green information systems versus regular information systems, I'd say that information systems in general is something that we define as both the information technology, that is the hardware and the software and the processes and the infrastructure behind it generally to achieve a certain task or outcome. So that could be, you know, supply chain management systems in the classic information systems category or ERP systems such as SAP or, uh... or Microsoft Dynamics 365, etcetera. However, green information systems, they are the concept of information systems but applied to environmental sustainability so that they uh... contribute to environmental sustainability objectives in organizations through using information systems such as green supply chain management systems.	-
8	P6	OK. So it's about the end use of the product, not how the product is made.	-

9	Valde-mar	Yes, so it's how the information system is used exactly. Yeah, so, if that makes sense.	-
10	P6	Yeah, that's fine.	-
11	Valde-mar	Okay, perfect. So if you don't mind, we would really like to hear a bit more about your background within the... this field and your experience within it.	-
12	P6	Yeah, sure. So I'm working in the sustainable investment team at [redacted] and as an index investor, we have more than [redacted] companies that we currently are invested in and through our investor engagement, we need some sort of, uh, tool to, uh, yeah... supervise our portfolio, getting the relevant ESG data from our part and also to some extent screen the portfolio for the parameters that, uh, we're interested in following a bit for specific companies. So those portfolio tools are the main IT tools that we use.	Informate
13	P6	In addition, we have... do proxy voting for a service provider who also has an IT system where we can... uh, keep track of our voting policies and where we have all the data we need to watch and so on. So that's the two main main systems that we are using for this purpose.	Informate
14	Valde-mar	Okay, interesting. Yeah, uhm, so this kind of brings me a bit to my next question because in terms of your company's approach to environmental sustainability in relation to their investment strategy... as you've already mentioned that you use these two tools to assess the portfolio and ESG parameters related to that. So if you could just elaborate a bit on that, that would be really interesting... on how your company's views on environmental sustainability... how they relate to the investment strategy in a way.	-
15	P6	Sure. So, our... our main... We have three entry points into managing portfolios in our investments from an ESG perspective, it's from where I'm sitting at the ESG management part.	-

16	P6	It's... one, we do a project-based screening first. So we have a range of companies that we don't invest in because of products that they produce or the services that they provide, which includes coal and conventional weapons, tobacco, etc.	Exclusion
17	P6	And then finding what takes a lot of our time and resources is following up on more individual companies in our portfolio where we think there's room for improvement and we base that on a certain set of criteria for how we engage.	Critical investors, active ownership
18	P6	What companies are sort of in a financial risk position because they're not doing well? And where do we as an investor have some leverage?	Risk reduction, active ownership
19	P6	It's given... a number of the companies, even if we have a lot of money, it's not... our percentage share in each company is very low, so we consider carefully where it... it makes sense for us to engage. So these are the three main entry points for our ESG work.	Active ownership
20	P6	Yeah, the product screening is relatively straightforward, but, uhm, we need the data of course. So typically for some of the criterias, we set a revenue threshold. So for instance, say, we don't invest in companies that have more than 5% of the revenue from coal production. We need the proper data for that to check that. But then that's relatively straightforward.	Exclusion
21	P6	And then on company engagement, we need as much data as possible on all the relevant ESG issues. That's, that's often a limitation, on how much you can get... you can get from our data.	Data quality, data consolidation
22	P6	But again, those are the three main lines of engagement. The right investments are more in, yeah, opportunities that come from, often from companies that are closer to our own backyard. So I think in many Norwegian companies, our funds and portfolios already have some connections and experience and cooperation already.	Active ownership

23	Valdemar	Okay, I see. So, uh, a bit of the exclusion policies, I could gather and also some specific inclusion or focus on companies that provide, uhm, what should you say, environmentally sustainable products and business models. And also these engagement activities that take up a lot of time where there is an extensive follow-up process, I can understand, if that's correct?	-
24	P6	Yeah.	-
25	Valdemar	Okay. So regarding this follow-up process, I guess that there are many different situations that you encounter. And, and sometimes improving environmental performance, uhm, is something that has to be done. But have you experienced, uh, situations where environmental performance and profits or organizational performance are at odds? So that if you've improved the one, then the other kind of suffers a bit or vice versa. Is that something you've encountered and how did you address it?	-
26	P6	Huh, well, I guess that's the main hurdle point of, uh, of many, if not most of the engagements.	Trade-offs
27	P6	It's various degrees. It's, uh... one thing is to invest in... directly in cleaner technologies or clean up in your backyard. Just direct short-term costs to companies which may or may not be challenging to, uh... for them to cover or to calculate into their revenue streams.	Short-term costs
28	P6	Uh, I guess that's the simple answer, and for others, it's quite fundamental to the whole business model. I mentioned coal, which is sort of outside the whole... the range of opportunities to improve, so we don't invest in it at all. Then you have oil and gas companies that, uh, need some kind of transition plan to be in line with our expectations on climate.	Environmental goals, transform
29	P6	So, uh... yes, there is from our perspectives and expectations, both in terms of financial return and long-term environmental responsibility, that companies should and will in the long term benefit from adapting. But, but that's certainly a challenge to many companies and clearly a direct financial challenge as well to many.	Synergies, quantitative appraisal

30	Valdemar	Yeah, definitely. Uhm, and I heard you mentioned a little bit about these green business models and clean technologies, et cetera, where it's... where it's maybe as opposed to the fossil fuel industry where these types of clean technology companies have sustainability integrated into their business model.	-
31	Valdemar	So just thinking in terms of synergies, do you see any synergies between, uh... or do you encounter any synergies between environmental performance and profits, like the opposite type of example as opposed to the former one?	-
32	P6	Yeah, I guess as you indicate, there, uh, there are companies that are already positioned in terms of low carbon technologies, uh, renewable energy and, and other, say greener or less harmful production methodologies... methods. Yeah, so a whole range of products there and companies there as well. The simplest, most obvious ones being those related to renewable energy production.	Eco-efficiency, eco-equity
33	P6	Yeah, but also in agriculture and, and... chemical processing and so on, and mining. There's lots... a lot of sort of in-between challenges where you need to sell a lot of new materials, uhm, but with limited or minimized environmental footprint.	Eco-efficiency, eco-equity
34	Valdemar	Yeah, definitely, definitely. So when talking about this broader topic of environmental sustainability, uhm, you mentioned that a lot of companies, they are working on, uhm, their sustainability transitions, and they are, uh... and you follow up on their performance. So in your opinion, what... what stage do you think companies are at right now in terms of sustainability versus where they should be in your opinion, if that makes sense?	-
35	P6	Yeah, that's really a company-by-company question, but there are companies in all sections of the scale.	Large emitters
36	P6	Uh, if you look at the world, as a total, it's still a long way from where we need to be. Some companies are driving this in the right direction while others are dragging it	Strong sustainability

37	P6	But clearly overall, a lot of companies, and not to say most companies, have quite a long way to go, especially those in high climate emitting sectors.	Large emitters
38	Valdemar	Yeah, definitely. So it depends on industries as you said, there are some carbon-intensive industries such as mining and other, uh, industrial sectors as well. So I think, uh, to mitigate this, well, not only in these sectors, but in many other sectors, a lot of companies turn to	-
39	P6	Sorry, I'm just entering a tunnel. So if I'm breaking for a while, then just hold out for a few minutes and I'll be out there. But maybe the coverage is okay. So just continue.	-
40	Valdemar	Sure, sure. And let me know if the audio disappears at some point. I can repeat after. Uhm, so, uhm, in terms of these different industries that are at different points in the scale, uh, and some lag behind and some... some strive a bit forward. A lot of companies, they turn to green information systems to improve their environmental performance, to push themselves to that direction, as you mentioned, the leading companies are in...	-
41	Valdemar	So for example, a lot of companies turn to environmental and carbon management systems that are systems that collect and monitor environmental data for sustainability reporting. For example, their annual sustainability reports, and to, uh, kind of automatically calculate the carbon footprint of the organization's operations, which is usually pretty complex. But the information systems can support that. Uhm, so I'm just thinking in terms of your opinion... uh, from your standpoint, what benefits are there in doing this?	-
42	P6	Oh, I guess, uh... all companies need now to have a control of their own emissions and also broader environmental footprint.	Control
43	P6	They need to report on it, and these are the data that our source suppliers are picking up. So the more exact those data are, the better for our portfolio overview.	Informaté, quantitative environmental performance
44	P6	But they also need it for their own, uh, management of emissions and footprint.	Informaté

45	P6	It doesn't solve anything by itself,	Unclear business value
46	P6	uh, but I guess for most companies it's, uh, important both to be able to quantify their footprint, their emissions, to be able to prioritize where they, uh... they can put their efforts in terms of improvement and then they need to measure improvements as well also to ensure progress.	Informate, quantitative environmental performance
47	P6	And they need this as a starting point just to think through where there are and, and what challenges they have and what opportunities there are. I think this is... or getting the overview of their footprint is fundamental to most of the companies now. Exactly how they do it, it's uh... it's up to them, of course, but quality of... of data is important for both them and us.	Data quality, high-level information
48	Valdemar	Yeah, yeah, and I... I think you touch upon an important point there of data quality, which is well... well in both research and practice a pretty big issue as well in terms of reporting.	-
49	Valdemar	Uhm, so this might be a risk or a downside to the... some of these systems that might not have the highest data quality. So I'm thinking in terms of risks and downsides to implementing such systems. Do you... do you see any other risks or downsides from... from your point of view?	-
50	P6	It's a continuous process of improving data collection both in terms of scope and uh... and quality to prioritize action for improvements and keep updated data. But there's no way around it. You need data and the better quality, the better, and broader the scope, the better for everyone.	Data quality, data consolidation
51	P6	But for many, it's a process.	Change impact
52	P6	You have to have somewhat relatively short and manageable supply chains, uhm value chains... and when it gets complex then you can't expect them to fit everything in	Complexity, data consolidation
53	P6	*Audio connection lags, unintelligible*	-

54	P6	But at this stage, we expect most companies to be well on their way in developing solutions and reporting on it.	-
55	Valdemar	Okay, I see. So reporting.... it really becomes important for both themselves to see where they are in terms of sustainability, and... uh and I guess also for the investors looking at them. However, as you mentioned, there is an issue with long supply chains where all of the parties in the supply chain have to supply more environmental data, in that case, in order to calculate their final footprint: the... the scope three footprint if I'm not mistaken.	-
56	Valdemar	Uhm, so uhm... we already talked a bit about reporting systems, but another class of information systems used for sustainability might be these more transformational ones. These could include, for example, systems that improve circularity in the business model, for example, a web platform or an app... uh, platform that allows consumers to, for example, uh, send back their products for repair and for resale or refurbishing or recycling even. For example, Apple's buyback program where you can send in your old iPhone, uhm, or old device and then... then uh get a cash reward for that or a gift card reward for that as to promote recycling. Uh, that was one example of them using this online platform to fight electronic waste basically. Uh, so these are, well, more transformational and relate more to the business model itself of the company.	-
57	Valdemar	*Valdemar inhales sharply*	-
58	Valdemar	And a lot of people perceive these as a bit more risky in terms of they introduce new technology and this radical innovation. So, uhm, I don't know if you've encountered such types of initiatives that resonates with you, but if you have, uh... I'd just really like to hear more on your take on risks connected with such transformational initiatives.	-
59	P6	*Participant 6 clicks tongue* Uh, again, I think that's more a company by company consideration and not something we would usually interfere with, but rather trust the management of the company to make decisions on that.	High-level information

60	P6	We might, uh... we might be encouraging circularity, expressing our expectations on performance at... at various levels, but we don't normally engage with companies on how exactly they... they, uh solve their challenges.	Active ownership
61	P6	They develop the business model. That is really fundamental to the core of the business model. It's not really something we would normally engage in, but leave to the discretion of the management.	High-level information
62	Valdemar	Okay, so it's more of the, how to say... the top line data that you're interacting with. It's... it's not so much that you want to interfere with these more internal matters then.	-
63		Yeah.	-
64	Valdemar	Okay, I see. So I guess moving from this specific kind of benefits-versus-risk perspective, uh, I... I would like to hear more on your thoughts as an index investor, uh, in terms of how market trends are looking in terms of this topic, for example. Are there any recent developments in terms of these systems that we've been talking about so far that you've noticed?	-
65	P6	Uh, I guess we've been discussing the need for standardized data is increasing and for any index manager, it's... we need some kind of system to organize our portfolio and uh... that allows us to aggregate data.	High-level information, standards and certifications
66	P6	I don't know if... I mean, clearly, there's a lot of service providers that offer this in various shapes and forms and with more and more demand for ESG-relevant data. More service providers are offering various types of products.	ESG data providers, quantitative environmental performance
67	P6	I guess we relate more to the services that's being offered than the specifics of how, sort of, the technology behind it is being developed. A lot of companies or service providers are offering risk-based tools for our use. It's more than we need and not always so relevant to us. Of course, I'm more interested in hardcore company data than broader risk assessments, but the offers we get on various types of risk assessments, whether it's on product,	Quantitative environmental performance, quantitative appraisal

		environmental impact, on geography, et cetera, it's... that is increasing.	
68	Valde-mar	Okay, I see. Uh, so these types of data, although these providers usually provide much more data than what's relevant in... in your case, there are a lot of very specific indicators that you look for, I gather.	-
69	P6	Yeah.	-
70	Valde-mar	Okay, because in that regard, I'm thinking as managing such index funds, there are several... or well, there are a wealth of indices to select between and to follow with the portfolio. So I guess there must be some factors such as carbon footprint that influences your decisions in terms of which index to follow or how to engage and follow up on these companies.	-
71	Valde-mar	So I'm just thinking, uh okay, so we've mentioned the carbon footprint being a pretty significant factor, the financial indicators also being significant factors. But are there any other factors that come to mind that are important in this discussion, uhm, if that makes sense?	-
72	P6	Well, just to clarify, that, as an index investor, we have different indexes that we operate with. Uh, those are generally broad market indices and we start and take them as an entry point and just filter out the products that we don't want there.	Exclusion
73	P6	And then from there on, it's the... it's the ownership engagement that we discussed. The carbon footprint is a big issue. We look at transition strategies on our ESG follow-up and... and we look at environmental parameters.	Quantitative environmental performance

74	P6	And then there are two levels of that, it's... one is the extreme damage type, which can be anything, but excessive environmental impact along any... any line of impact really. And then additionally, we strategically select some companies or industries that you want to follow up with.	Large emitters, active ownership
75	P6	We have a role to play and we can contribute. And that can be... let's say mining, and then it... we'll be interested in as many environmental, environmentally specific parameters and in particular strategies as possible. So this is also where forward-looking ambitions also come to play. We're more concerned about companies' strategies in terms of improving environmental performance than exactly where they are at the moment. But that... there can be a range of different environmental parameters dependent on the company.	Strategic justification, active ownership
76	Valdemar	Yeah, all right. So this was a bit more detailed approach, I can understand, than this, uh, you know, passive investing in index funds... that there are active exclusions and inclusion policies and, uh, active ownership as well.	-
77	Valdemar	So I'm just thinking this is a bit more of a detailed approach than... One of our previous interviewees, he said that typically fund managers have 60, 70, 80, even 100 different stocks to, uh... to look at and to evaluate in their portfolios. So they don't really have the time to go in and look at the specific transition plans for each company.	-
78	Valdemar	So I'm just thinking in terms of... of your perspective, is this... is this just something you devote more time on and therefore it's possible, or what's your take on, uh, this topic?	-
79	P6	Hmm, as I said, we have a responsibility towards our whole portfolio, but... but we have to be a bit strategic in where we engage. So, we pick an industry, a subsection of an industry or certain companies that we are interested in for particular reasons, and we... uh, we follow up through ownership engagement with them.	Critical investors, active ownership

80	P6	It's to a limited degree about excluding or, uhm, increasing exposure, but engagement. The number of companies it can be, in any case, very limited compared to the total number of companies we're invested in. And... *Participant 6 chuckles* But it can be as many and as few as the companies... or the investor dedicates resources to in terms of... but it's correct that as you indicated, that compared to the total number of companies, it's very limited.	High-level information
81	Valdemar	I see. Okay, I understand. So that's interesting. So you have, like a specific approach where you have certain companies that you devote a bit more engagement to because they are particularly interesting, you mentioned, if-if that's correct?	-
82	P6	Yeah.	-
83	Valdemar	Okay, but what makes these companies stand out? What makes them particularly interesting? Uhm, I'd be interested to hear	-
84	P6	As I mentioned, we have to be a bit strategic. It's... it has to be something, companies or sectors, where one is relevant or has a high footprint.	Large emitters
85	P6	It's... We need to have some leverage in that, because perhaps we have a bit higher exposure or it's companies where we have a good dialogue and meaningful conversations.	Active ownership
86	P6	And to some extent, we try to also think whether these are, sort of companies or sectors that can drive systematic change. So we typically engage with companies that we think set global standards. So it's a range of strategic questions that we ask before we select the sector and companies within that sector.	Eco-effectiveness, new markets
87	Valdemar	Okay, yeah, I see. Uh, so I guess this kind of brings me to my next question in a way because, well... a lot of talks have been about these specific company-to-company analyses where, okay, "we have this specific transition model," I mean, for companies that are particularly interesting and also the general, a bit more quantitative assessment of the other companies, the broad majority, I guess.	-

88	Valdemar	But for all these companies, I guess a lot of investors have these traditional financial techniques of appraising the value of these investments. So, for example, net present value or discounted cash flow techniques.	-
89	Valdemar	However, the benefits of using green information systems such as the reporting systems, energy and carbon management systems that we talked about - they, uh, they enable companies to see where they are in terms of environmental sustainability and enable them to direct their efforts to the right part of the organization, so to speak, in terms of their environmental performance. But these benefits are maybe a bit hard to quantify in, uh, in crowns or euros, so to speak.	-
90	Valdemar	So, how... or from your perspective, how does this challenge get solved or how does it... how to take this into account, if that makes sense?	-
91	P6	Again, as an index investor, we don't really make financial evaluations on a company-by-company basis. We invest according to the market that, uh, the industry represents.	-
92	P6	So, our starting point is the market we're invested in. We pick out the products that we are not interested in and we engage in all bigger companies where we feel there are challenges or are substantial rooms for improvements. We don't have that company-by-company evaluation issue, really.	High-level information, large emitters, active ownership
93	Valdemar	Okay, I see. So, well, yeah, obviously, as the index investment strategy follows a market index. That's, uh... that's right, yeah. But that's interesting.	-
94	Valdemar	So, first off, the portfolio is based on an index, as the name implies, and then the second step is then to exclude the companies that have... uh... what should you say, that have assets in industries or areas that are above a certain threshold, for example, in coal, et cetera. And then after this, uh, selection process, there is a lot of active engagement in these companies' transitions. Uh, or is that correct?	-
95	P6	Yep. That's how...	-

96	Valdemar	Okay. So, I guess a bit of a final question. I might be jumping to a completely different topic here, but these monitoring systems for sustainability reporting, they are becoming, well, increasingly important.	-
97	Valdemar	There's new EU regulations, uh, that a lot of our previous interviews also have talked about the SFDR for, you know, sustainable funds and sustainable investing.	-
98	Valdemar	Also, the Corporate Sustainability Reporting Directive from the EU, the CSRD that, you know, forces a lot of large companies within the EU to disclose their sustainability data in reports.	-
99	Valdemar	So, we're just thinking in terms of this, do you feel like a lot of companies are ramping up their efforts in terms of, uhm, reporting on sustainability, or is it still a bit of a slow transition, or how... what's your perception?	-
100	P6	Well clearly, for all European companies, these are compulsory reporting requirements that are coming in a not too distant future. So, all companies that are within the scope of the regulations are looking at this.	Compliance
101	P6	Those who haven't really started preparing themselves have their hands full now to get these... their systems going, while those who have been a bit more forward-looking are relatively prepared for this.	Green IS capital
102	P6	For the broader market, uh, clearly, the EU is the driver here, but you see similar reporting requirements being developed, yeah... particularly in North America, but also globally.	Compliance
103	P6	So, among those other companies, there is also a trend, clearly, among the larger and more serious actors to come, uh, online with comparable ESG data and comparability qualities. These are big discussion issues to make sure that we can compare companies across markets and geographies. And... and this is certainly a big issue for the companies as well.	Standards and certifications

104	P6	It's given by EU regulations, but for other companies, it's about trying to influence regulatory developments, so that data are... and reporting requirements are as comparable and accurate as possible.	Compliance
105	Valdemar	Ok, yeah. So, in other words, if I understood it correctly... that these new standards and this... these new requirements for reporting makes it easier to do fair comparisons of companies, and uh, in an accessible way because these reports are becoming increasingly accessible, I guess.	-
106	P6	Yeah, that's the... the crux of the challenge right now. In the EU, it's relatively consistent with the regulations being developed, but companies across the world want to make sure that what they report on are consistent and that they are being fairly evaluated. So consistency and comparability is a big and ongoing issue.	Compliance, standards and certifications
107	Valdemar	Okay, I see. Well, I think those were the questions for us. Uh, however, we would just like to hear if you had any closing comments or thoughts or questions or anything?	-
108	P6	*Participant 6 clicks tongue* I think that's quite comprehensive. *Participant 6 chuckles slightly, both interviewees smile* And we've been around the issue now	-

Appendix 8: Interview With P7

Line	Person	Content	Code
1	Researcher	<p>Now, let's start the interview and to kick off our conversation, we would like to hear a little bit about your background and experience related to the research topic.</p> <p>Can you please tell us about yourself and your involvement in our interest in green information systems?</p>	
2	P7	<p>Yeah, my name is [redacted] and I'm currently employed at the [redacted] Fund, where I'm involved in multiple of our programs where we do funding for a lot of green research amongst other things. My background is that I'm a trained physicist from [redacted] and has also been working in research and development in a private company before I got to [redacted]. Not as much with information systems, that's more when I've joined the [redacted] that we have seen a lot of projects on this topic in the recent years, because there's a lot of focus on being green and in that sense, how do you state about being green, where we see a lot of discussions about having the same frame of reference in that discussion.</p>	
3	Researcher	<p>Okay, yeah, interesting background.</p> <p>So a bit of a natural scientist in the beginning and then pivoting over into more of an innovation business and sustainability environment, I could understand.</p> <p>So in that regard, I was thinking in terms of our broader overarching topic of environmental sustainability. So I guess just to start off and lead our conversation in on the topic, I'd just like to ask you about your perception of environmental sustainability, how would you define it in your terms?</p>	
4	P7	<p>Yeah, that's a good question and a big question, because like you said, I think it's this focus on making solutions that are not dependent on scarce resources.</p> <p>So for instance, like where you can foresee a long future, where you can either have circular economy or whatever, in order to be able to continue the manufacturing of the product, but also that there's no environmental hazards in the long term when you're developing your solution that you always have that in mind, I think it's the key here is that we should see our world, our earth as a circular economy all around, like you say, some of the older civilizations, they had a much more continuous</p>	

		<p>flow of stuff instead of being reliant on digging up rare materials all over the world that we know would run out in a near future. So I think that's, yeah, the main is that it's, you can see a long future for this kind of product solution moving forward.</p>	
5	Re-searcher	<p>Okay, I see, I see. So a lot of interest in sustainable products and that very much resonates with the research we've read as well, so interesting to hear the practical perspective on this. So we've already talked a little bit about, well, a little bit about business value in this regard that these products, well, to define them as products, they have to be financially viable, they have to be able to be sold, etc. However, sometimes there might be situations where environmental sustainability and business value might not go hand in hand, that there might be other cases. So I'm just interested in hearing, if you've encountered such cases and how to approach this trade off, so to speak.</p>	
6	P7	<p>Yeah, you could say it's always a fine balance to have these come because, like you said, you want something that's financially stable, or because otherwise we'll just run out in some way. But I would say that where before you might have, yeah, either or of this environmental or and financial, you kind of saw them as opposites. I think there's been great shift in recent years towards that they are mutually excluding. So if you're not an environmentally friendly solution from the beginning, it will never be financially sustainable, because both from, I can say that there's a regulatory point of view on it that we start to demand, but also the consumers are also putting more and more requirements on the sustainability of the things that are being put out. I think it's, we have had a long period where it was about faster, cheaper, more bigger phones, bigger cars, whatever. And we are seeing this with the recent focus on energy based on the Ukraine crisis, the war on Ukraine, that people sort of got an understanding that energy isn't free, and that resources isn't free is not just something that we can just order from Amazon and get delivered. It's something that we need to consider. And also that we also see a lot of where people, when soon as you make a new product, you will have to consider how to recirculate it, how to get it back. So I think where it has, before you have been seen as opposites pulling in different directions, it's being seen also because people are willing to pay more for sustainable solutions. So it can</p>	(GBS)

		actually be a positive financial step for you to make an environmental friendly solution in that sense.	
7	P7	<p>And also it's a lot, we see a lot of investors, including ourselves also, it also has a lot to do with freedom to operate, that we know that if you don't consider this already from the beginning, then you aren't guaranteed that this could be banned in the near future. So, so I would say, and of course, you can say right now we have a lot of discussions on this CO2 capture, where we are trying to capture CO2 from emitters to lower the environmental impact of the CO2.</p> <p>But a lot of the solutions that you capture CO2 with today is based on huge amount of chemicals that you need to absorb, dissolve this CO2, or maybe high amounts of energy if you want to do this, what's called cryogenic freezing.</p> <p>So you're moving one problem, but relying on a huge amount of sustainable energy that you need to produce from generating windmills or solar cells that put a lot of strain on other parts of the environment.</p> <p>So I think it's an interesting time that we are moving into where sustainability has become much more important than it has been before.</p>	(RCI)

8	Re-searcher	<p>Yeah, okay, because what I could gather from some of this, or just just to summarize to ensure that I got this correctly. So that there's been a lot of mention about, well, the synergies as well between environmental sustainability and business value, such as, you know, license to operate, as you mentioned, pretty well, because regulators are coming after this topic and they're going to, and it seems that many developments are pointing towards, well, their ambition to broaden their sustainability goals and make them more ambitious. But also in terms of this cost efficiency focus, that's also something that green technologies, as you mentioned, can enable with less resource intensive processes. But you also mentioned something about this, what should you say, not conflict, but maybe challenge that some, not all green technologies and initiatives are born equal. Some maybe shift the problem other places, such as the carbon capture example you mentioned.</p> <p>So just thinking in terms of the, you know, other instances of this where you've seen, you know, an idea is called sustainable, but it kind of shifts the issue somewhere else, like the carbon capture issue.</p>	
9	P7	<p>Yeah, I would say the biggest one is, like you say, electrical vehicles, which is what we see a lot of people are developing solutions based on batteries that are dependent on, yeah, more or less slave labor in African countries, which because also you said that's environmentally sustainable, but also social sustainability, which is another big issue.</p> <p>And I think we have been used to that these materials magically appears in our part of the world from somewhere else. And you can say that the COVID crisis also made that apparent that these resources comes from all over the world. And if that supply chain breaks down, then it's, it doesn't run in the way that it did. So for sure is electrical vehicle is one of the bigger, bigger topics at the moment, because it's at the moment based on some very harsh material or some very rare materials, but also there's a lot of discussion about what about fires and the health hazards and environmental impact if you want to get rid of these batteries.</p> <p>I think that's one of the one big issue that we are in as an [redacted]. We are seeing projects towards battery disposal. How do we do that?</p>	(SSC)

10	P7	<p>But also, of course, that's also being done a lot for battery development, but especially the disposal of it or re-usage of batteries is a big topic in order to be able to call electrical vehicles environmental friendly or environmental sustainable at the moment. So I think there's probably there will be a big industry based on refurbishing or reusing or recycling or whatever of old batteries in that sense, because it's very complicated. And also it's more or less the same with fuel cells, which today are also based on some rare earth materials. And if people look at it and they say, yeah, if we want to shift our entire automotive industry to either battery or fuel cell, then we will need so much of these rare metals that we don't know how to get that. So I think that's an interesting discussion about when is something environmentally friendly or environmentally sustainable when it doesn't, I can't see it right now at least, this is a closed system. But they say that like the COVID crisis also puts this agenda, because you found out that you're relying on other countries and sometimes some countries that you might not agree with that you're putting your sustainable future in the hands of somebody else. So I think there's been some interesting side effects of the COVID crisis and the war on Ukraine that shifts this way of seeing resources as something you just purchased.</p>	
11	Re-researcher	<p>Okay, so definitely some new developments, some new nuances becoming more parent now, such as the use of rare earth metals for all these sustainable technologies, etc. So I guess problem-sizing are these solutions actually doing, but that's also an increasingly critical topic in a way, if I understood you correctly.</p>	
12	P7	<p>Yeah, and especially about being, when you're talking about being environmentally sustainable, is it often I would see that it seems sustainable in a local context, but in a global context, it often breaks down. And I think that's a big issue that yeah, you see electric cars, it's nice clean air in our cities and it's very nice and everything, but if you just pushed the emissions somewhere else, yeah. But then again, that's some of the problem and why this information systems are so important, because it doesn't make sense just to have low CO2 emissions in some parts of the world if you just move it, then it doesn't really change it. So as this local versus global aspect, I think is also an important aspect of it.</p>	(LGS)
13	Re-researcher	<p>Because I guess that a lot of times when something becomes cleaner, it just relocates the dirty parts of the production process to other regions in a way.</p>	

14	P7	<p>Yeah, maybe, not necessarily. If you have a good solution, then it doesn't. But the problem is that you need to understand the whole system or the whole value chain or supply chain in order to understand the total environmental sustainability of a product. And I think that's one of the biggest issue of these information systems is this huge amount of information that you need to collect and how can you guarantee that the things that are being produced are being produced the way that they are being said or putting requirements and like this putting some of the buyers, they put requirements on the suppliers. But it's very difficult to control this and agree on how do we define CO2 emissions.</p> <p>Also what you're looking at is this information part of it. There's a lot of talk about what we mean. And I think that's one of the biggest issues, or one very big issue right now is being on the same page.</p>	(VCU)
15	Re-searcher	<p>Yeah, I see what you mean. I guess you already mentioned our next topic a little bit in terms of the environmental and carbon management systems. These systems that track, trace, monitor and generate reports based on greenhouse gas emissions and other environmental data or other environmental performance indicators, such as waste generation or pollution data, etc. These are becoming increasingly important for many organizations around the world, especially I guess the western world, as research suggests. So you already mentioned a bit about the benefits in terms of, oh, how can we guarantee that this product is sustainably sourced or sustainably produced? And how can we guarantee that the carbon footprint is accurate? And also in terms of calculations, because the calculations, as you mentioned, or if I understood you right, they're incredibly complex as well. I'm just thinking, you already mentioned some of these benefits of generating accurate data and accurate indicators, but what benefits do you see in a broader sense, if that makes sense?</p>	
16	P7	<p>Yeah, I think one of the biggest benefits of it is actually, we actually see a lot of companies who actually want to do something about it. But the problem is that they want to be sure that they get the credit. The work that they are doing is somehow benefits their business or their emissions. There was this huge, say, period where all this you could buy trees to be planted, to offset your emissions. And all this system, you can buy trees and then after a couple of years, it showed that a lot of these trees were just chopped down after a couple of years or they died or whatever. And then it didn't. So I think it's a lot about having an even playing field for the companies, because there's actually, I feel there's actually a lot of companies that have understood the importance of thinking this way. But it's just very difficult for</p>	(DCR EE), (NGS)

		<p>them to comprehend or maintain an overview of what is good to do and where is the easiest things to do first instead of doing the most complicated first. So I think this helping the business owners or investors make good decisions is one of the key benefits of it, because a lot of them really want to, but they don't know how.</p>	
17	P7	<p>And they can't really understand the complexity, because it's so complex, it's very difficult to understand. So this making it or transfer it to something that's easy accessible or easy to, maybe not easy to understand, but at least easy to summarize in some sense. I think it's key for making some conservative business people make the right decisions, because I think that's at least what I see. There's so much confusion about lifetime assessment, environmental goals, UN goals, whatever. There's so many words and and phrases and models and whatever that you can follow. It's actually starting to make the decision to do the right thing more difficult in that sense, because there are so many people trying to figure out and again, it's very hard to agree on this is how we calculate it, because then, oh, but it's not that's not the right for us. And so the discussions are in some sense, like a democratic approach to how we measure this. And it's good because everybody gets to have the say, but it also complicates it even further. So sometimes we would like the policymakers to set some standards. But the problem is that it's also very, very difficult for the policymakers to set those standards, because like I said, I'm a [redacted] fund, we're using [redacted] money for this, but and we see there's so many interests in play that are coming with the inputs to policymakers on how should you even do it.</p>	(CAS M)

18	P7	<p>Like you just saw, I don't know if you saw in Denmark, they put a they would put a tax on each kilometer, a truck driver drives in the truck. And then everybody started to block the highways. And I was like, oh, but it's not a fair way you do it. I was like, okay, it's actually quite simple suggestion that you should pay for the amount of kilometers you drive. But even that was full of criticism. So it's a very complicated and I don't have the solution yet. But I think it's one of the issues is that it's yeah, there's just so many words that the companies can beat, they can have a difficult time even choosing what is right, because it's what is in what context do you mean, right? And like you said before, there's still the financial aspect, so they would rather put their money at the best or the most optimal area. But it's often it stops taking a decision, because you're afraid of taking the wrong one in that sense.</p>	
19	Re-researcher	<p>Okay, so these all these, well, conflicting perceptions of what is sustainable, what's green, and how to define all these very popular terms such as life cycle assessments, or scope, scope three calculations, etc. And, and I think you also mentioned a pretty thorny and pretty big issue in terms of data and standards, because there have been other interviewees that have advocated for this, you know, standardized, equal way of calculating, for example, scope three footprints. But it's a hard issue, because, well, the democratic process kind of allows a lot of voices to come with each of their own opinions on how to calculate this. So that is also a confusing factor if I understood you right.</p>	
20	P7	<p>Yeah, exactly. This idea of a universal data approach is, yeah, we have invested a lot of money in different companies, coming with ideas to make solutions for this, trying to do some kind of data acquisition in some sort. But it's, and it's, I believe that we're doing progress, but it just takes a lot of time. And it's so, so I think it's, and if you know if you want, the UN, they made their sustainability goals.</p> <p>It also took some time to select those and those only, because everybody like us in the [redacted], we have, back in 2021, we got 700 million Danish Kronos for four green missions, where we have made mission partnerships. And one is for CO2 capture, one is for power tax, one is for sustainable agriculture, and one is for circular economy within plastic and textiles.</p> <p>And all right away, somebody asked, what about water? Shouldn't there be a mission for water?</p> <p>Yeah, maybe. What about data? Shouldn't there be a mission for data? Yeah, but it might go across.</p>	

21	P7	<p>Yeah, okay. But it's always, you can always add some extra. So this limiting to a certain area is difficult. And I think a lot of politicians, they, yeah, we had four, so it's nice to have something to start on. And we can do that. But yeah, so yeah, and we are spending a lot of, like I said, a lot of funding on data, data acquisition, can we do some kind. But I think the issue often here is also policymakers likes to make policies around solutions that are already there. So if you make a globally accepted information system on this, then it would be easier to define and say, you should follow this or this, this solution or something similar, then they can do it. But as long as there's no globally accepted way of doing it, it's also difficult. So it's this catch 22, which comes first, the definitions of the solution. And often it's an intricate play between those two. So I think the solution is some of the big consultancy firms or something like that will start to do something standardized or you should at least bring them to some kind of talk about some standardization, maybe a small country like yeah, Denmark or Sweden or whatever could try to establish something that could be an inspiration for the rest of the world.</p>	(DS)
22	P7	<p>But I think it's, it is complicated, because obviously we have seen a lot of suggestions on it, because everybody wants to have it, like some of you that you have interviewed is, yeah, if you just get that, then it would be great. Yeah, okay. But yeah, if we could define that everybody uses the metric system in the world, it would also be easier. But the Americans still use the imperial. So even like that, what is a unit of measurement? We haven't even defined on a global scale. We agree on it in large part in most of Europe. But even that, there's not maybe in the scientific community, not in the public. So so why do we think that we can make a clear definition on how to acquire data? So yeah, so but it's, I think it's taking small steps towards something. And we have some of the bigger companies in Denmark that are having like a value proposition to come and do this calculations and do it across multiple projects so that they can compare, for instance, big infrastructure projects, if they start to have some of the same companies that are doing the lifetime analysis, then you can at least compare those two projects if the same company that has done it in the similar way. But again, yeah, it's especially when we're talking, yes, go three assessments, they are just pretty complicated because you don't have unlimited data acquisition down in your supply chain. Some somewhere you have to do assumptions and that's where the discussions arise. What is a good assumption on this?</p>	(DS)

23	Re-searcher	So yeah. Yeah, so complicated issues and many different actors try and come with each their own solution, but some attempts at standardization are being made somehow.	
24	P7	Yeah, of course, there's a lot of people that are doing stuff and which will emerge as, as the one that we go with. I think it depends on a lot of stuff. So right now it's a very bottom up approach. We don't have this top down. And I also see that it's very difficult to do top down in this sense because there's so many people that will comment on whatever decision is being made.	(BTD A)
25	Re-searcher	So yeah. Yeah, exactly. As you mentioned, like the kilometer tax on trucks in Denmark, a lot of people will comment as soon as there are these regular straight top down initiatives.	
26	P7	Exactly, because then it's not fair for us and blah, blah, blah. And then, yeah, instead you have this system that they're trying to develop for the taxation of your property in Denmark also. And there's so many discussions about that because then they're trying to get a complete solution that can try and predict your property value, but it just gets crazy complicated. So there is some, I think also maybe some of the solution might come from that you're not trying to report on everything, but you're defining your utility usage, how much electricity and water, because you might have a meter that measures that and do that equally or something like that. And also what kind of material are you purchasing? So in some sense that way, but I know there's always ah, but we recycle and blah, blah, and we should be subtracted and all that, but it's, yeah. And that's why it becomes, yeah, it goes out of hand, but it's some initial, yeah, at least trying to cut it into smaller sections that you're focusing on and developing from there, I think is the way to go because the other thing is just so massive and so, yeah, complicated that it's difficult to stay from the beginning.	(SF)
27	Re-searcher	Okay, yeah, I see. I see. So I got the large-scale initiatives, as you say. I am interested to hear your opinion on if the public or the companies are not mature since they're criticizing it or, for example, you took the example about the trucks. And do you think is it because that the people are not, or the society is not mature or aware enough or the companies when it comes to these initiatives?	

28	P7	<p>Yeah, I don't know if it's not mature, but I think it's very much about that it's, that there's this idea that it should be fair. It should be equal for everybody. And nothing in the world is equal for everybody. So I think it's, like you said, there's this in the beginning, like this financial versus environmental discussion, where it's like, are you willing to pay 20% more than your competitor in another part of the country in order to assist in this development towards a more sustainable future? And I think the problem is always this competition that within the same industry, it's very important or they feel like they shouldn't be handed something or they shouldn't have it easier than us. So I think it's, it's this focus on fairness in some sort that is destroying it. And of course, comes back to the financial aspect. So you could say in that sense, they might be less mature in looking at the environmental sustainability, because still the financial, that's it. Yeah, we want to do it, but then everybody has to do it. Want to have similar rules. And as again, they want the top down approach. And it's just so damn difficult to make it the top down approach, be fair in any way. So, yeah, yeah, because you can have some company, they spend a lot of money doing, trying to be sustainable. But if it's on the day to day competition, I think it's, yeah, then the financial part of it starts to dominate. Maybe in the management or the board of directors, they can look at sustainability from a strategic point of view. But if you look at a salesperson, they don't want to lose an order, because they have to put an extra tax on each kilometer that they, when they ship goods to some parts of Denmark. So it might be this maturity down in the company.</p>	
29	P7	<p>Like, does everybody know that this is important? Because we actually had some big companies living in the northern part of Denmark. There's some big truck companies that they didn't protest. They accepted it. So I don't know, actually, I don't know why, but just know that this wasn't the way that they wanted to fight this by protesting. But they had other means. And so they seem to have understood it, because they're a bigger company and have a bigger fleet of trucks and all that. And maybe have some more maturity on this area. So actually, I think it might be something there, that the smaller the company, the less mature you are on taking these hard decisions or accepting the transition.</p>	
30	Re-searcher	<p>Yeah. Okay. So it also comes to how the companies are waiting, for example, the financials or the sustainability, if maybe that's a bigger cooperate, they might wait</p>	

		in the sustainability higher than the financials, maybe, whereas the smaller companies could probably focus on the financials instead. And the longer term, maybe look at the sustainable part of it.	
31	P7	I think there's this long term, it's important that the bigger companies often have a longer horizon that they plan for. The smaller company might plan the remainder of this year. And the bigger companies have a broader horizon and can see the benefits of being part of this journey, like with the freedom to operate in the future. And the smaller companies, they don't see as far. They just need to pay the bills in the upcoming. And so, but I think, and we see a lot of younger people that are starting businesses, they are born with the mindset more than some of the older companies. They are, yeah, that's fine. They don't value it as much because they're just doing business. And yeah, China is polluting 100 million times more than us. It doesn't matter little me, what I do. So it's, for sure, we see some of the younger people, they have this, yeah, born with the mentality of sustainability. And so, that's an issue that we have, that's been spending a lot of money on this green transition also in other public areas. And it's at the older companies, or where the owner is the manager. They are sometimes a little more reluctant, a little bit slower to this, where if they have a big board of directors, they are actually starting many times, and also see shareholder sometimes that they are starting to demand that you actually consider this because they know it's good business also, because they know freedom to operate will be determined or can be limited by it.	
32	Re-searcher	Oh, interesting, because this kind of, if you don't mind, have a, because this kind of speaks into an article that we came across in our literature search, and it focused on shareholder reactions to companies announcing initiatives with green IT. Our scope is more around green information systems, but many things are similar. So, for example, these monitoring systems, and also some systems that enable production efficiency to make the production processes more efficient with information technology. These types of technology were something that investors reacted very positively towards. However, these more transformational technologies, such as those that enable like radically different sustainable and business models with the help of information technology, such as, for example, web or mobile platforms for circularity, such as Apple's buyback program for old devices, etc. Usually when companies announce such initiatives, the share price usually drops quite sharply. And then again, the article was published in 2017, so there have been six	

		news since then, but I just be interested in hearing your take on this, like, how come there's this difference?	
33	P7	<p>Yeah, and as far as I understand what you say, it seems like shareholders like slow transitions. I think it's what I hear from it, and I think about that you're starting to do something, you're starting to measure or at least collect your carbon footprint or whatever, and a lot of companies still talk about carbon, because they have just learned that about measuring the carbon footprint and when it's like, yeah, but that's the first step. But where the other thing is that you're actually adding on new business models or new business areas, and I think that sometimes people can be or the shareholders can be scared of rapid transition in companies. So I could imagine that this is because, like you say, because again, freedom to operate a lot of countries are starting to demand that you do some kind of carbon footprint management. And again, with the top down is that you have to do something.</p> <p>That's what they can agree on. You have to do something, but not necessarily how do you have to do it. That's the difficult part now is to start, but at least it's a start that everybody starts to do it, because then we can have a good discussion about what can we add on as mandatory parts of it moving forward. So I think that they see that as a necessity if you want to stay in business, this part of it. But the next part of it is something it becomes because this take back, for instance, is complicating your business. And they might not see the value. And it just seems like an added expenditure to the business because, okay, now we have to take it back and we have to get rid of it. But I think that's because a lot of people don't understand here, but that's the way you have to do business. And also that if you can get the product back and recycle the materials, then you're actually, I can say COVID has moved a lot of this because they saw material, like I said, materials is not as easy to get as before. And if you can get the material back and reuse it, then you're actually putting yourself in an advantage in that sense. So I think I would think that some of the things because yeah, shareholders, they are not the most innovative people. Let's say like that. They like stable dividends, stable</p>	

		revenues and in that sense. But they know, of course, you know, they know that you should start to follow with the times because it's so apparent that this is the way it's going.	
34	Re-searcher	Yeah. Okay. So in other words, the writings on the law, like people know where we're headed. And it is definitely progressive. So I guess we have only talked a bit about the different classes of information systems that we've encountered so far in our research, both these monitoring systems, these efficiency systems, also these more transformational ones, we just wanted to double check if they understood that if it's transformational ones, they're a bit radical and I'm not really understanding the business value or the technology or the business model behind it. So that kind of scares them off. If that's correct.	
35	P7	Yeah, at least it's something where the company moves to a different business. And a lot of people, they buy in on the business that they're doing. Okay, are we starting to become a recycling company all of a sudden? We have been a manufacturing company. Why are we doing recycling now? I think it's something that can get people a little anxious about what direction are we moving? And if you don't understand the financial aspect of why you're doing this and not just because not just because that the politicians say it, but it's actually the way to do business in the future. And I think that's, yeah, people they like to get a	

		good return on their investments. And that's a lot of evil has been done based on that.	
36	Re-searcher	I hear what you're saying. I hear what you're saying. And staying within the fear of the global financial perspective where people want good returns on their investments and maybe not focusing on so many other factors, I guess, because this kind of points towards the often very quantitative way investors evaluate their investments, such as net present values like these kind of cash flows, very estimated value of future profits, etc. So these very quantitative methods, whether there are many non-financial benefits of these green information systems such as a better overview of the environments of performance of different business areas or visualizations, etc. Or even this changed business model that's enabled by these radically innovated ways of using information systems. I mean, they're hard to quantify in krona or euros or whatever currency you're using. So in your terms, how to approach this from that?	

37	P7	<p>I could say that we have in the [redacted] actually shifted. I think for a couple of years ago, we had this criteria when we do grants is that it should be what is the financial impact of the project. It was the term that we used and we have actually updated it just to impact actually to include this broader, more environmental focused aspects. So like I said, some of the, let me say, what I'm trying to describe, I say, yeah, if you make a solution that lowers the garbage production of a city by 50%, but you're only just getting enough revenue that you can support maybe two or three employees, then it's still a very good project. So we have actually included that, but also something like biodiversity is also something that we have put in parts of our criteria that it's actually evaluated while it's seen as an important impact. The way that we say, we try not to define how to measure that. We're putting on the applicant to define what is the impact that this project will have. Like to say, is this a 50% reduction? Is it increased the number of, like for biodiversity, a number of special insects with 100% or whatever? They are defining the impact because we're trying as much as possible to include as many projects as possible. So we try not to define it too harsh, but I think it's an important aspect that we are focusing on impact in a much wider term that we did before. We're very focused about, because the [redacted] is here to invest in companies and ideas that can provide growth and jobs for the Danish community. But we have also taken on the part that this should be with the green mindset. So I think that's also a change that we have seen the last couple of years is actually seeing impact in a lot wider perspective. And I think it says something because like this way of impact is more or less defined from the policies or the politicians saying to us that we should be more green. So we have actually put this in as a consequence of what they have stated. So they have actually said that this [redacted] fund should put emphasis on impact that's not just financial. Of course, we would like it to be a financially independent or sustainable company. And if we can provide workplaces and bring green solutions to the rest of the world, then it's great. But it's not necessarily that's in itself that's important only anymore.</p>	
38	Re-researcher	<p>So. Okay. Well, I think these were using some really good inputs. So it's interesting to hear the practical perspective, especially on this innovation focused fund that we're working. But I think this concludes the last question for me. So just them again, in terms of if you had any opposing comments or questions or anything.</p>	

39	P7	No, not not. I think the only thing is that what you're doing is important. Sometimes I think when you look at it, it can be so it can feel very complex and very hard to grasp. But it's so important. Because we're talking a lot about environmental sustainability and whatever. But we need to speak the same language when we talk about it. I think that's the I have a brother who's from human sciences and he speaks a lot about speaking the same languages. I think that's the biggest problem right now is that people are speaking in their own tongue, so to speak, from their point of view.	
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Appendix 9: Notes Prior to the Second Interview Transcript

Hon arbetar med [raderat]bankens aktieanalys ur ett hållbarhetsperspektiv och med institutionella kunder, men investerar inte själv i sin arbetsroll. Dock berättar hon att hon är ganska väl insatt i hur investerare tänker.

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