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## Article

# A Need for Standardized Approaches to Manage Sustainability Strategically

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**Abstract:** This study aims to explore the challenges and opportunities associated with measuring and assessing sustainability impacts and investigate digitalization's role in addressing these challenges. The study gathers stakeholders' perspectives on strategically managing sustainability and employs a qualitative research approach, utilizing semi-structured face-to-face interviews with seven industry participants. The findings reveal that the measurement and assessment of sustainability impacts pose significant challenges due to the lack of standardized approaches and the diversity of evaluation methods. Companies have started to address these challenges by applying digitalization to standardize and streamline sustainability measures. Digital platforms and technologies are being developed to collect, analyze, and report sustainability data, providing a foundation for reliable and comprehensive sustainability reporting. This study contributes to the existing literature by highlighting the need for standardized approaches and digital platforms for measuring and assessing sustainability impacts. The findings emphasize the importance of integrating sustainability into corporate strategies, as well as the role of digitalization in enabling companies to focus strategically on the most important societal goals. The study also underscores the need for clear definitional parameters and accurate measurement of sustainability performance. Overall, this research highlights the potential of digitalization in driving meaningful change and promoting sustainability in economic, environmental, and social domains.

**Keywords:** sustainability reporting; impact assessment; digitalization; strategic management



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## 1. Introduction

Despite concerted efforts at the national and international levels to promote sustainable economic, environmental, and social activities, a major challenge persists in the form of underdeveloped sustainability measurement and the lack of essential outcomes and impacts [1]. This means that the sustainability impacts of any initiative are difficult to measure, document, and communicate consistently and comprehensively, posing significant challenges to strategic engagement with the sustainability agenda [2,3]. While discussions on sustainability should encompass economic, environmental, and social performance robustly and comprehensively, methods for measuring economic performance, such as ROI, ROA, EBITA, and EPS, are widely perceived as systematic and robust [4,5]. In contrast, measuring environmental and social performance lacks a similar historical pedigree. Similarly, measuring the quality of governance either lacks established approaches or relies on an indirect approach through financial performance and the reducing agency costs [6].

In addition to the general deficiencies in measuring business activities' environmental and social effects, the impact assessment of sustainability initiatives is inadequate and lacks standardized approaches. Instead, evaluators often tailor the impact assessment to their own systems, exercising wide discretion in choosing indicators and methods [7]. This diversity of approaches hinders comparability across firms and projects, resulting in a lack of cumulative practical and academic insights. To produce solid and reliable sustainability

reports, it is crucial to have relevant, complete, timely, comparable, and verifiable information and measures (this can be coined as a “digital platform” or a technology-based framework that enables the development and deployment of a wide range of digital services, applications, and resources). However, no common global methodology or platform for disclosing information supports the transition towards a low-carbon and equitable society aligned with international agreements, such as the Paris Agreement and the Sustainable Development Goals [8–10]. Without a standardized methodology and technology, there is a risk of working on sustainability in a non-strategic manner, using various indicators, conversion factors, and data sources.

To address these challenges, developing new methodologies and technology holds promise in enabling businesses to focus strategically on the most important societal goals. This can lead to increased success and reduced costs in non-compliance with sustainability agreements. This empirical research examines how seven Icelandic companies from different industries have utilized digitalization to standardize previously unsystematic and unreliable sustainability measures. These companies have developed different approaches that ensure comparability across initiatives and provide a reporting platform for these measures.

The study aims to gather stakeholders’ perspectives on strategically managing sustainability. The results highlight the need for a robust digitalized platform to collect and analyze relevant sustainability data, addressing managers’ difficulties in strategically determining the appropriate measures to drive their businesses towards sustainability.

This article provides a theoretical overview, followed by an explanation of the research methodology, a presentation of the results, and a discussion of the findings.

## 2. Literature

### 2.1. Sustainability Challenges and Importance of Integration

Sustainability problems associated with economic activities have led to the belief that companies thrive at the expense of society [11]. While shareholders benefit financially, governments and philanthropic organizations strive to address global environmental and social challenges [12,13]. Consequently, governments, local authorities, businesses, and other stakeholders commit to solving urgent economic, environmental, and social issues at different levels [14]. This commitment emphasizes generating shared societal value [15–17]. Investing in sustainable projects [5] presents an opportunity to capture socially responsible opportunities [12,17,18] where the objective is to achieve positive social and environmental impacts alongside financial returns, which is not feasible through conventional investments or philanthropic grants alone [16]. Considering societal impact when making investment decisions expands the scope of solutions for social and environmental issues, even when governmental and philanthropic funding decreases [5].

Enhancing sustainability by reducing negative impacts, implementing projects with positive impacts, and implementing responsible governance processes has gained significant attention from investors. Institutional investors, who traditionally focused solely on financial performance, now incorporate environmental, social, and governance criteria in their decision-making, considering the interdependencies of sustainability characteristics [19,20]. However, challenges arise due to conceptual clarity, inconsistent terminology, and definitional accuracy in sustainability initiatives [21,22]. Additionally, high-quality information on the impact of sustainability is lacking, posing difficulties in assessing relevance, completeness, timeliness, clarity, comparability, and verifiability [8]. Ambiguous terminology and definitions also pave the way for “greenwashing” and misleading stakeholders regarding environmental and social initiatives. Such issues hinder the adoption of impact investing and understanding sustainability initiatives [3,23]. The scarcity of high-quality information affects sustainability initiatives and investors, highlighting the need for studies incorporating social impacts and financial return data [24,25]. Therefore, bridging the gap between scholarly and practitioner knowledge is crucial [26], necessitating longitudinal studies and confirmatory research regarding sustainable investment [27]. For

accurate scholarly discussions, establishing clear definitional parameters for sustainability is vital [23]. Measuring sustainable performance without conceptual and definitional transparency becomes challenging [3]. Scholars must also quantitatively relate social outcomes to initial change theories [27] and use authentic measures to assess sustainable performance [12,28]. Developing a framework for measuring sustainable impact is deemed the most valuable contribution of academic research [7], and longitudinal studies on the relationship between sustainable initiatives and impact are called for [29].

Companies aspiring to incorporate sustainability strategically often integrate environmental, social, and economic considerations into their core business practices and decision-making processes. This integration involves setting clear and measurable sustainability goals and targets aligned with an organization's mission and values. Goals may include reducing greenhouse gas emissions, minimizing waste, promoting diversity and inclusion, and improving working conditions. Setting sustainability goals directs a company's sustainability efforts, guiding decision-making processes and stakeholder engagement. Companies typically adopt industry-specific and customized sustainability goals at the corporate level, aligned with global frameworks like the Sustainable Development Goals (SDGs), their unique business context, and stakeholder expectations. Following established frameworks such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB), sustainability reports are often used to communicate progress towards these goals, ensuring accountability and transparency. Viewing sustainability as an integral part of a corporate strategy allows companies to create shared value where societal and business interests intersect. This approach influences business models, product development, supply chains, and stakeholder engagement practices, recognizing the importance of aligning ESG considerations with an organization's mission and values [15].

## 2.2. *The Need for Clear Definitions and Quality Information*

Stakeholder engagement is a fundamental aspect of integrating sustainability into corporate strategy that involves the active engagement of individuals and groups with an interest or stake in an organization's operations and impacts. Effective stakeholder engagement aligns with corporate social responsibility (CSR) principles and sustainable business practices, considering the interests of shareholders, customers, employees, suppliers, communities, and other stakeholders [30]. Ongoing dialogue and collaboration with stakeholders while using mechanisms such as advisory boards, surveys, public consultations, and sustainability reporting enable companies to understand concerns, gather input, and build relationships based on trust and transparency. Stakeholder engagement helps identify emerging sustainability issues, respond to changing expectations, and co-create solutions considering broader interests. Moreover, it enhances corporate reputation, risk mitigation, and social license to operate [10,30]. International initiatives like the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) guide report on stakeholder engagement practices [31,32], while effective stakeholder engagement fosters accountability and contributes to long-term success through mutually beneficial relationships [10,30].

Addressing environmental, social, and ethical concerns within operations and extending influence on suppliers and partners is crucial to sustainability strategies. Sustainable practices throughout the supply chain, from raw material sourcing to product end-of-life management, are essential. This encompasses responsible sourcing, ethical labor practices, waste reduction, and circular economy principles. Global frameworks like the Ten Principles of the United Nations Global Compact [33] and the Sustainable Development Goals (SDGs) [34] guide these practices. Certifications and tools such as Fair Trade and ISO 14001 significantly evaluate and ensure supply chain sustainability. Addressing supply chain sustainability is vital for organizational resilience, compliance, and broader sustainability goals [9,35]. Sustainability reports are essential for companies to communicate their sustainability efforts and performance. These reports follow frameworks like the Global

Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure consistency and comparability. Sustainability reporting extends beyond financial metrics, providing a comprehensive view of a company's sustainability initiatives, challenges, and progress. The GRI framework enables the disclosure of various sustainability aspects, including environmental impacts, social responsibility, ethics, governance, and economic performance [31]. The SASB has developed industry-specific standards for financial material sustainability information, aiding investors in assessing ESG risks and opportunities [32]. Transparency in sustainability reporting fosters accountability, builds trust among stakeholders, and attracts responsible investors, meeting the growing demand for sustainable products and services. Initiatives like the Task Force on Climate-related Financial Disclosures (TCFD) highlight the importance of climate-related information for investors [36]. Transparency and reporting on sustainability performance showcase an organization's commitment to ESG principles, stakeholder engagement, and alignment with sustainability goals [31,32].

### *2.3. Integrating Sustainability into Corporate Strategy*

Risk management and sustainability are closely intertwined, as organizations recognize the impact of ESG factors on financial stability and reputation. Integrating sustainability into risk management processes is crucial for identifying and mitigating risks associated with operations, supply chains, and stakeholder relations. ESG-related risks, such as climate change and social unrest, are consistently identified as pressing global threats [37]. Sustainable risk management involves assessing potential risks, understanding climate change impacts on supply chains, labor rights violations in the supply chain, and other ESG-related risks. By addressing these risks, companies enhance resilience, protect the brand reputation, and avoid financial losses. Sustainable risk management also presents opportunities like renewable energy markets and environmentally friendly product development [38]. Integrating sustainability into risk management ensures organizational preparedness in a complex and interconnected business landscape, contributing to sustainability and resilience [38,39]. Resource efficiency is a crucial aspect of treating sustainability strategically, focusing on responsible and efficient resource use to minimize waste, reduce environmental impacts, and enhance economic and environmental sustainability. Concepts like the circular economy aim to eliminate waste and keep materials in use longer [40]. Optimizing resource use reduces costs while mitigating environmental degradation and resource depletion. Efficient practices include energy conservation, water management, sustainable sourcing, waste reduction, and eco-design of products and services [41]. Initiatives like the SDGs encourage resource-efficient practices for sustainable development [34]. Resource efficiency is central to balancing economic growth and environmental preservation, making it integral to sustainable business practices [40].

Employee engagement is vital for company sustainability initiatives, fostering a sense of purpose, commitment, and responsibility. Engaged employees contribute to sustainability efforts, recognizing the impact of their actions. Engagement positively affects sustainability outcomes, innovation, and financial performance [42]. Involvement can take various forms, including training, awareness programs, project participation, and integration of sustainability goals into job roles and evaluations. Organizations prioritizing employee engagement in sustainability create a culture aligned with their values, empowering employees as sustainability champions [43]. Employee volunteering programs, green teams, and sustainability communication strategies enhance engagement and fulfillment [44]. Recognizing the link between engaged employees and sustainable practices, companies increasingly involve employees in sustainability to foster responsibility and innovation [43,44]. Investors acknowledge the material significance of ESG factors in assessing a company's long-term financial performance and risk profile. Sustainable investing has gained momentum as responsible investors seek companies with strong ESG practices. This shift is driven by the recognition that ESG factors affect financial stability and reputation. Reporting on ESG performance and following frameworks like GRI and

SASB aids investors in evaluating risks and opportunities [31,32]. ESG indices and rating agencies further assess and rank companies based on sustainability performance [6]. Proactive engagement with investors on sustainability matters enhances access to capital, reduces the cost of capital, and strengthens the market position [4]. Strategic partnerships and collaborations are essential for advancing sustainability goals, allowing organizations to combine resources, expertise, and influence. Collaborative efforts between businesses, governments, NGOs, and stakeholders drive innovation, knowledge sharing, and scalable, sustainable solutions. Partnerships facilitate sustainable supply chain practices, with cross-sector collaborations addressing systemic issues like climate change and sharing their best practices [45]. Partnerships enhance reputation, market reach, and shared value creation while contributing to a more sustainable future [15,45].

In conclusion, sustainable investment and strategic approaches to sustainability have gained significant prominence as companies recognize the importance of addressing environmental, social, and governance factors. Integrating sustainability into corporate strategies involves setting clear goals, engaging stakeholders, addressing supply chain sustainability, promoting transparency through reporting, managing risks, optimizing resource efficiency, fostering employee engagement, and fostering strategic collaborations. These practices enable organizations to create shared societal value, enhance resilience, attract responsible investors, and contribute to a sustainable and equitable future. Based on the above, this study aims to explore the challenges and opportunities associated with measuring and assessing sustainability impacts and investigate the role of digitalization in addressing these challenges.

### 3. Methods

The present study employed a qualitative approach, utilizing seven semi-structured face-to-face interviews for 55–85 min each. The methodological strategy adopted was purposeful sampling, which allowed the researchers to obtain valuable insights into a specific topic by selecting participants who could provide relevant information. The process of identifying interviewees who met predetermined criteria for participation was conducted [46]. In this study, participants were recruited through a purposive sampling method. The selected participants were individuals employed by seven companies in six different industries, specifically focusing on sustainability, digitalization, and strategy in their managerial roles. These interviewees were chosen based on their expertise and knowledge of the impact of sustainability and digitalization on strategy processes. The subsequent data analysis involved preparing and organizing the collected data for further examination. Common themes within the data were identified through a process of coding. Finally, the results were comprehensively described [47]. It is important to note that this research was conducted without a pre-existing theory and instead adopted a theory approach that was formulated based on the data generated and acquired throughout the research process [46,48].

Table A1 provides an overview of the interviewees' composition, highlighting slight differences in their managers' roles and responsibilities for sustainability transformation projects. The gender distribution among the interviewees consisted of two men and five women. The age range of the interviewees spanned from 34 to 55 years, with their tenure as managers and responsibility for sustainability varying from 3 to 17 years. The interviews were conducted from December 2023 to February 2024. To ensure confidentiality, each interviewee was assigned a numerical identifier from one to seven. All interviews were recorded and transcribed verbatim. These transcriptions were thoroughly examined and identified prominent themes [48]. The researchers had no prior affiliation with these companies' activities and had no personal acquaintances among the interviewees. The researchers maintained a neutral stance and refrained from expressing personal opinions during the interviews.

The methodological approach employed in this study was qualitative, with the data being collected through interviews. The semi-structured interview guide consisted of six

parts, covering background questions, the previous approach to sustainability strategy work before digital solutions, the reasons for applying digitalization in strategy work, access to data through digitalization and its impact on strategy work, the direct application of digital solutions in sustainability strategies, and current and future opportunities and hindrances in applying digitalization to sustainability strategies. A common understanding was established on what “digital technology” means in the context of this research, as it is to be understood and applied in a broad manner, including a wide range of devices and systems (including software and applications) that enable a variety of functions for processing data collection and complex data analysis.

Each interview was conducted using online Microsoft Teams software. The participants were informed about the research and the purpose of the interviews, and full confidentiality and anonymity were assured. All interviewees gave permission for the interviews to be recorded and agreed to be quoted. Notes were taken during the interviews that were not recorded. The interviewees were selected based on their experience with applying digital solutions to sustainability strategy work and were contacted via email, wherein the aim of the study was presented. A descriptive list of the participants can be found in Table A1 in Appendix A.

The participants were given a number and a reference to his/her role, e.g., Participant One came from a retail company and is identified as “P1.R” (as participant #1, coming from retail). Participant two came from the finance industry and was identified as “P2.F” (Participant #2, coming from finance).

After the research data were collected, the interviews were transcribed. The transcribed interviews were coded, with coding used to assign shorthand designations to different aspects of the data so that the researcher could quickly access specific items. Open coding was used to mark important points or phrases for further data analysis. Themes and subcategories were defined according to the nature of the questions and the categorization of the interviewer’s main motivations. All interviews were coded by one researcher and reviewed by the co-researcher to ensure the internal validity of the coding. The themes derived from the coding of the interviews can be found in Table A2 in Appendix A.

#### 4. Results

A statutory obligation to report non-financial or sustainability information, established in 2016, seems to have been a major milestone for companies working strategically on sustainability within the European Union and EFTA countries. The obligation is an act (Article 42 of Act no. 73/2016, amended Act no. 3/2006 on Annual Accounts regarding disclosure) incorporated from the European Union (EU) Directive 2014/95 on non-financial disclosure and diversity. In essence, larger companies must, by the act, disclose information necessary for assessing the company’s development, scope, position, and impact. The breadth of this requirement provides companies with significant discretion in crafting the content of their disclosures. This fact is much grounded in the results of interviewing the research participants. The subsections below cover the different themes of the interview guide. It starts with presenting the strategy work on sustainability before applying digital solutions. Then, there are the challenges and opportunities to be searched when deciding on digital solutions. The third subsection then discusses the impact of data in strategy work for sustainability by applying digital solutions. The fourth subsection follows the key success factors needed for applying digital solutions, and the fifth examines the type and use of data on sustainability when applying digital solutions. The sixth and final subsection regards the current and future challenges of applying digital solutions to sustainability strategies.

##### 4.1. Strategy Development

Prior to 2016, all of the participants claimed that their companies were attempting sustainability, but not necessarily in a very strategic way. Sustainability had not become a pillar of any strategic importance, and even the word or concept of “Sustainability” was not being applied. There was CSR (Corporate Social Responsibility); before that, the theme

was coined as “good business ethics”. Companies participated in community projects, mainly local to their operations, by financing local sports and art clubs. An interviewee from a large IT company claimed that it was mostly focused on social and environmental issues, but not in any strategic way. In that respect, the company pushed internal matters like having employees recycle trash and give up their trash bins. The battle had begun in regard to changing mindsets and behaviors, but it had no strategic connection to the company’s operation, and technical solutions or support were not applied. This experience is reflected when a sustainability manager from a large retailer discusses the company’s sustainability history. He claims,

*“There did not exist any formal strategy processes for sustainability before applying digitization. That is because necessary data was so lacking when discussing sustainability. Then, later, when we had gained access to data, we often found out that what we decided as a priority of sustainability initiatives was the wrong emphasis for the business. Today, this would be called Green Washing.” (P1.R.).*

The latter interviewee (P1.R.) touches upon an important part of how working on sustainability can become a part of a company’s strategy. That happens through knowledge of what initiatives support an overall strategy, as well as how to measure those initiatives. Digitalization and proper software application appear as the most important ingredient, as one interviewee states:

*“Around the year 2016, the bank was mainly focused on the Nasdaq Stock Exchange measurements and how those could direct us towards some initiatives. Not the other way around, meaning what the bank’s strategy could need regarding sustainability initiatives. We had not begun to measure much of the sustainability impact the bank might have had.” (P2.FIN.).*

It is interesting to understand what made the bank move or take the next step for pushing the sustainability agenda, and the same interviewee stating:

*“It was actually the societal move to much more awareness of the general public that pushed the bank’s sustainability agenda. Around 2016, we hosted a large-scale workshop with our employees. The employees wanted to apply the SDGs as a strategy for the bank’s sustainability agenda. Then, at the same time, our foreign wholesale banks began asking us about our bank’s strategy for sustainability. However, we were restricted from doing any real strategy work then because of a lack of technical support. We were doing everything in Excel, and it was enormously complicated.” (P2.FIN.).*

Lacking access to necessary data and not having the right initiatives meant that companies were doing more ad hoc than strategic measures. Data followed digitalization. A manufacturing company that truly impacts its environment claims that nothing of importance happened until after the introduction of technical solutions.

*“We were just recycling, and our most important task was to convince our employees to use common but not private garbage bins. We had no basic information on our environmental impact because we had no tools to apply for that purpose. It was not until we implemented our first IT solution in 2016 that we got going. Then, we implemented a dashboard, which is an ERP or enterprise resource planning software system that helps us run the business. We applied supporting automation and implemented processes into finance, human resources, manufacturing, the supply chain, our services, and procurement.” (P3.P.).*

It seems that, only a few years back, these companies were generally not working strategically with their sustainability agenda, with the main reason being the lack of data supported by digital solutions. The next section introduces the next phase in development, when companies were pushed forward by regulation and opportunities to apply digital solutions that would aid them.



#### 4.2. Challenges and Digital Solutions for Sustainable Strategy

Act no. 73/2016 introduced a provision on non-financial information that incorporated the European Union directive on non-financial disclosure. What changed then is that companies were mandated to disclose non-financial information. This pushed companies to search for digital solutions because, without data, it would be hard to make any such non-financial disclosures, as the law required. The challenge facing companies following the act's introduction was not only finding the best fit digital solution, but that the law did not specify what non-financial information companies were supposed to disclose. Randomness was then often the approach, but not a strategic one. One manager from a retailer said:

*“Data is such an important ingredient for making strategy, but people within sustainability did not necessarily know what data they needed. So, they just bought whatever IT solution there was. Most went to the ESG framework Nasdaq had published. That was most likely a fine start, where after a couple of years of that, sustainability managers found that they needed something much more tailored towards their operations.” (P1.R.).*

A bank manager described a very similar experience.

*“When we first prepared to disclose the non-financial information, we did it all in Excel. Then, in 2016, we bought an IT solution that we applied for data collection and processing of that data. We are still applying that solution, but it does not cover all our needs for data on the bank's sustainability impact. Hence, simultaneously, we have had to develop our own software solutions to supplement those we buy from IT partners. There has been a boom in software companies providing IT sustainability solutions, but we do not see any that cover a bank's needs. Furthermore, we rely so much on data that other institutions provide, like state-owned institutions and others from municipalities, that do not provide us with the data we truly need. This means that our non-financial disclosure is often story-telling because the data does not tell all the story” (P2.FIN.).*

On a similar note, another banker described how important it is that digital solutions do not become too complicated.

*“A bank can impact sustainability in society through lending and investments. That means measuring our whole portfolio of lending and investments, which is a gigantic project in terms of scale and scope. The data that has to be collected is vast and impossible without the assistance of a third party. Hence, we and other banks cooperate with credit companies that collect various data types from our customers. But we ourselves analyze the data in-house and disclose it. That also provides us with the necessary privacy over data, which is vital for trust.” (P7.FIN.).*

The same situation is to be found in other industries as described above. When interviewing a sustainability manager in the fisheries, they indicated that digitalization is all about data, including access to data, data analysis, and data disclosure.

*“The goal is not to count or quantify. The goal is to initiate strategic goals with an impact and digitalization measures that impact. We need to know how we are doing. Sustainability is a core part of our business strategy today because we need to market and sell our fish. Hence, when we talk strategy, we talk sustainability, and data is floating around it.” (P6.E.).*

This means that sustainability has become an integrated part of strategy, and data is the core ingredient in that process. Stakeholders become important variables in the process, where they can impact everything from being a data source to being recipients of products and services. A manager from an IT company is in harmony with other sustainability managers, and software companies might not have managed to tailor their solutions toward the uttermost needs of companies in search of digitalization.

*“We have had to program our own IT solutions and access data from data sources no partner has access to. This is both challenging and provides threats. That is because, in*

*the current sustainability environment, you must be certified for what you do and how you do that. That is difficult when you are making your own solutions from scratch. Then, on the other hand, you want to manage your data completely in order to build trust with your stakeholders.” (P4.IT).*

This leads to understanding what has been accomplished by digitalizing sustainability and strategy.

#### 4.3. Harnessing Data for Sustainable Strategy

When interviewees were asked about the impact of greater access to data on sustainability, the answers rested, on one hand, much on the impact on employers, and then, on the other hand, in getting sustainability initiatives achieved. This might not come as a surprise. Employees can access sustainability goals, KPIs, and results if managers allow them to. Some interviewees said this information is accessible to employees on their companies’ intranets. A big change is that now data is guiding when it comes to strategy work on sustainability initiatives. Another big change from just five years back is that most companies have to look at their extended value chain when thinking strategically about their sustainability impact (and what impact, e.g., suppliers have on them). The Corporate Sustainability Reporting Directive (CSRD) applies to large companies based in the EU or with an annual turnover of above EUR 150 million in the EU. This directive puts yet stricter pressure on companies to have knowledge of their whole value chain, which companies cannot achieve without data. A retailer that imports food from another continent needs to know its own sustainability impact and how the producer of that food impacts its ecosystem. Hence, at the same time, data is becoming more available via digitalization, and the regulation is pushing companies to access further data on an extended value chain. The manager from the retailer mentions one example, as follows:

*“Palm oil is an ingredient in many products we import and sell. The production of palm oil has a bad impact on rainforests. We are trying to study that impact and which of our products include palm oil. Data is key. We have a lot of data, but which are the most important? Data can tell us where to put our focus when it comes to our initiatives within sustainability. This is as strategic as it can become because mistakes here can cost us dearly.” (P1.R.).*

Data seems to be instrumental in developing a strategy for sustainability. Access to data has removed employees’ focus from the tedious manual work of data collection towards becoming more strategic, tying sustainability initiatives to a company’s operational goals. As one manager said:

*“It is very important that sustainability as a subject does not end up as a silo in a company. It cannot end up at the table of some sustainability manager. The subject must be very multidisciplinary, and it must be connected to the financial results of an operation. My role as a sustainability manager is to influence employees that sustainability is completely related to the company’s financial results. We have an oil distribution division in our portfolio. That division will not exist in 2050. We must now address the financial implication of that for the company.” (P1.R.).*

Data and processed data in the information provided to employees are vital here. Technology based on digitalization will aid the impact data can have. Presenting results, whether negative or positive, can impact employees’ behavior, as well as the behavior of stakeholders and customers. That brings the discussion to what is needed to apply digital solutions successfully.

#### 4.4. Adapting to New Regulations and Bridging the Gap

Developing technical solutions seems slower than introducing new rules and regulations, and the speed at companies seems to be changing. This is of interest where, as mentioned earlier, the business for software solutions aiding sustainability initiatives is

booming. On the other side of the same coin, this is understandable, as new regulations introduce new requirements, e.g., for the type of data on sustainability impact and disclosing that impact. A sustainability manager of a bank said:

*“Technology is arriving slowly but surely, and it aids us in collecting and analyzing data. But we are doing much more complicated things than these IT solutions manage. Hence, we have to build our own systems. This is an international phenomenon within banking. The super large systems that banks are applying, like SAP, have a sustainability component. But changing or introducing new modules of such big systems is nothing that is done in a short period of time. Therefore, we must rest on our own ones in the meantime.” (P2.FIN.).*

This means companies must have resources to bridge the gap between what software producers can provide and what needs to be undertaken to avoid losing out on the sustainability race. Sustainability seems to be a subject the companies in this research truly have made one of their core pillars, as none of the interviewees complained that investments into the subject were seriously lacking. A buy-in from employees is a key success factor; so many of them have sustainability not as a core task but as a side-task attached to, for example, procurement (sourcing, acquiring, paying for goods and services), sales, storage, and waste disposal. A company might find itself in a situation where not all employees are eager to catch the sustainability boat, while all offices may be located differently in regards to awareness of sustainability matters. A sustainability manager at an international transportation company stated:

*“We have offices in 20 countries. It is impossible to believe that all employees in our very different locations are equally eager to join us on the sustainability wagon. We have decided to pick the largest and most important ones and put more emphasis on them both participating in pushing our sustainability agenda and delivering data on how they manage our sustainability initiatives. This is a risk management for us. Therefore, we concentrate on those offices that are of more importance to our operations.” (P5.T.).*

#### 4.5. Navigating the Challenges of Sustainability and Digital Solutions in the Face of Evolving Regulations

The challenges ahead seem to be much related to how the digitalization of sustainability solutions will manage to keep pace with new rules and regulations. Companies seem already to be at full speed, and regulation is driving that speed. From a sustainability manager of a bank:

*“This has become so madly complicated! At the same time, the financial industry is bombarded by many different requirements. Banking is becoming overly complicated when it comes to sustainability. EU Taxonomy and the SFDR, CSRD, NFRD, and the list continues. All these requirements demand data, which we, nor any other bank, has.” (P2.FIN.).*

On the other hand, it seems that the regulator and the Financial Supervisory Authorities will show an understanding that their demands might be premature.

The challenges seem to be around data and, therefore, the development of digitalization. It does not seem to differ which industry an interviewee comes from; they all mention the same challenges. At the same time, digital solutions seem to apply artificial intelligence (AI) already, which helps when data is missing. A manager from a retail company explains.

*“We import tortillas. The supplier we buy the tortillas from does not have data on the release of emissions for this product. Then, we apply AI to calculate as best we can to reach a conclusion.” (P1.R.).*

This is a part of the conducting strategy. A company needs to set goals, e.g., its emissions, which are related to what it buys and supplies the market with. Sub-strategies are needed, e.g., procurement, environmental and human rights issues, etc. The challenge is to strengthen the “data set”, which means gaining access to further data and more

precise data in order to be able to calculate more precise results. This is something that no individual company has control over. It concerns a long chain of partners and stakeholders as governmental agencies that collect and control data access.

Another type of challenge is the complication of the rules and regulations coming from the European Union. All of the companies contacted because of this research claim that more manpower is going into just understanding what current and forthcoming requirements mean in terms of sustainability disclosure. A manager from an international transportation company stated:

*“We were three managers from different company divisions, reading the same text from the EU on the new regulation, and none of us had the same understanding of it.” (P5.T).*

The complication of the regulation is not the only challenge of it, but the request. The content is also a matter to be discussed. The sustainability manager of a bank states:

*“The demands that are now being introduced in the form of regulation are very demanding on what data a bank needs to collect and analyze. Banks, in general, have neither. The data is not available by current digital solutions. And how the data is supposed to be analyzed and disclosed; the systems that could do that are currently non-existent. Therefore, banks have themselves been developing their own systems, which is a very ineffective way of running the whole industry.” (P2.FIN).*

## 5. Discussion

One of the main challenges identified in this study is the lack of robust and systematic methods for measuring environmental and social performance. While economic performance can be measured using well-established financial metrics, the same level of rigor is lacking when measuring initiatives' environmental and social impacts. This discrepancy is reflected in the historical pedigree of measurement methods, with economic metrics being perceived as more systematic and robust. The lack of standardized approaches to measuring environmental and social performance makes comparing initiatives across firms and projects difficult, hindering the accumulation of practical and academic insights [49].

Moreover, the impact assessment of sustainability initiatives is often tailor-made to the evaluator's system, resulting in a lack of consistency and comparability [1]. This further complicates the measurement and communication of sustainability impacts, as it can lead to disparate results that are difficult to aggregate or compare across different initiatives, sectors, or geographies. The diversity of approaches to impact measurement reflects the complexity and multifaceted nature of sustainability and underscores the challenge of achieving a standardized evaluation framework. This situation creates barriers to understanding sustainability efforts' full scope and effectiveness, making it challenging for stakeholders, including investors, policymakers, and the public to make informed decisions based on reliable and comparable data.

The absence of a unified methodology for assessing the impact of sustainability hampers the ability to track progress towards global sustainability goals, such as those outlined in the United Nations Sustainable Development Goals (SDGs). It also limits the potential for sharing best practices and learning from successful initiatives. In response to these challenges, there is a growing consensus on the need for a common global methodology and a platform for disclosing information. Such a framework would standardize impact assessment and enhance transparency, accountability, and stakeholder engagement in sustainability initiatives. A consistent and comparable approach to measuring sustainability impacts would facilitate the transition toward a low-carbon and equitable society, encouraging more effective and coordinated actions across different actors and sectors [45]. Establishing this global methodology requires collaborative efforts among governments, NGOs, the private sector, and international organizations to develop and adopt universal standards and reporting guidelines that reflect the complexities of sustainability while being practical and accessible for diverse users.

To address these challenges, companies have started to apply digitalization to standardize unsystematic sustainability measures. Companies can strategically focus on their society's sustainability goals by developing new methodologies and technology. Using digital platforms for collecting and analyzing relevant sustainability data can provide a solid foundation for reliable sustainability reporting. This study highlights the importance of a digitalized platform in facilitating the understanding and application of measures to drive businesses toward sustainability strategically.

The literature review supports the findings of this study, emphasizing the need for clear definitional parameters and accurate measurement of sustainability performance [1]. Scholars in the field have highlighted the crucial role of longitudinal studies in dissecting the nuanced relationship between sustainability initiatives, their long-term impacts, and the overall performances of organizations. Such studies are instrumental in understanding the dynamics and effectiveness of sustainability efforts over time, thereby contributing to developing robust frameworks for measuring sustainable impact [17]. Furthermore, integrating sustainability into corporate strategy is not merely a compliance exercise but a transformative process that significantly enhances a company's resilience, innovation, competitiveness, and reputation. This integration facilitates a more sustainable business model that responsive to environmental, social, and economic challenges and opportunities.

Exploring digital solutions as a lever for advancing sustainability strategies introduces challenges and opportunities for businesses. On the challenging front, the primary concern lies in identifying and implementing digital technologies perfectly aligned with an organization's unique sustainability goals, operational needs, and strategic vision. The complexity of navigating through regulatory landscapes and meeting diverse sustainability reporting requirements adds another layer of difficulty. Companies often face a gap between the capabilities of available software solutions and the specific data requirements for comprehensive sustainability reporting. This gap necessitates a strategic approach to selecting and customizing digital tools that can accurately capture and report on sustainability metrics.

On the opportunity side, the successful application of digital solutions to sustainability strategies hinges on several key factors. Firstly, securing employee buy-in is critical, as it ensures that sustainability becomes a shared value across the organization, fostering a culture of responsibility and innovation. Additionally, dedicating adequate resources to bridge the technological and knowledge gaps between software solutions and sustainability reporting requirements is vital for effective implementation. Finally, weaving sustainability into the fabric of the core business strategy ensures that sustainable practices are not siloed but are integrated into every aspect of the organization's operations and decision-making processes. This holistic approach contributes to achieving sustainability goals and enhances the company's overall value proposition, positioning it as a leader in sustainability and corporate responsibility.

Looking ahead, the challenges of digitalization in sustainability strategies include keeping pace with evolving regulations and the complexity of requirements. The development of digital solutions must align with the increasing demands for data collection, analysis, and disclosure [29]. The complications of regulations and the interpretation of requirements also pose challenges for companies. However, digitalization offers opportunities for improving data access, analysis, and reporting and enhancing stakeholder engagement and collaboration.

This study highlights the importance of addressing the challenges of sustainability measurement and impact assessment through digitalization. Companies can strategically focus on sustainability goals and drive meaningful change by developing standardized approaches and digital platforms. However, ongoing efforts are needed to keep pace with evolving regulations and ensure the effectiveness and efficiency of digital solutions in sustainability strategies.

The study utilized a relatively small sample size, including participants from specific industries and managerial roles. Therefore, the findings may not fully represent all industries or managerial perspectives. Future studies could aim for larger and more diverse

samples to enhance generalizability. As with any qualitative research, there is potential bias and subjectivity in data collection, analysis, and interpretation. Despite efforts to maintain neutrality, researchers' perspectives and interpretations may have influenced the study outcomes. Employing multiple researchers or using triangulation methods could help mitigate this limitation. The study focused primarily on the impact of digitalization on sustainability strategies within organizational settings. Other factors, such as cultural, economic, and regulatory influences, were not extensively explored. Future research could consider broader contextual factors to provide a more holistic understanding.

## 6. Concluding Remarks

This study emphasizes the challenges in measuring and assessing the impact of sustainability initiatives, highlighting a significant discrepancy in the rigor between economic performance metrics and those for environmental and social impacts. The lack of standardized methods for evaluating sustainability performance complicates comparisons across firms and hinders the accumulation of knowledge. Tailor-made assessments contribute to inconsistencies, making it difficult for stakeholders to make informed decisions. The call for a common global methodology and information disclosure platform is strong, aiming to standardize impact assessment and enhance transparency and stakeholder engagement towards a low-carbon, equitable society. Digital solutions are explored as a means to address the unsystematic nature of sustainability measurements, offering opportunities for standardized reporting and strategic focus on sustainability goals.

The literature review underscores the necessity for clear definitions and accurate sustainability performance measurement, advocating for longitudinal studies to understand the long-term impacts of sustainability initiatives. Integrating sustainability into corporate strategy is seen as a transformative process that boosts resilience, innovation, and competitiveness. However, challenges exist in aligning digital technologies with organizational sustainability goals and navigating complex regulatory landscapes. Successful digitalization in sustainability strategies relies on employee buy-in, resource allocation, and embedding sustainability into core business strategies.

Future directions include addressing the challenges of evolving regulations and the complexity of sustainability requirements through digitalization. While this study provides insights into the impact of digitalization on sustainability strategies within organizations, it acknowledges limitations such as sample size, potential bias, and the focus on organizational settings without extensive exploration of broader contextual factors. Future research could incorporate broader sample sizes and consider cultural, economic, and regulatory influences for a more comprehensive understanding.

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## Appendix A

Table A1. Interviewees.

Participant	Work Experience in Years within Sustainability/Digitalization	Position	Industry	Gender	Age
P1.R.	12	Manager	Retail	M	40
P2.FIN.	17	Manager	Finance	F	45
P3.P.	5	Manager	Production	F	39
P4.IT.	12	Manager	IT	F	50
P5.T.	15	Manager	Transportation	F	41
P6.F.	15	Manager	Fishery	M	55
P7.FIN.	5	Manager	Finance	F	44

Table A2. Themes applied in interviews.

Overview of Themes	
1	Strategy development
2	Challenges and digital solutions for sustainable strategy
3	Harnessing data for sustainable strategy
4	Adapting to new regulations and bridging the gap
5	Navigating the challenges of sustainability and digital solutions in the face of evolving regulations

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