Aligning Integrated Data Management with Corporate Reporting: The role of sustainability reporting

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Abstract

The EU/2014/95 Directive represents a point of discontinuity in corporate reporting which has produced several effects on corporate practices and communication. Corporate control systems also had to be updated to include financial and non-financial issues such as environmental, social and governance (ESG) issues within the control and reporting mechanisms. Integrated data management can represent a crucial tool for managing the changes in progress and improving performance. This study aims to investigate the relationship between integrated data management and corporate reporting by assessing whether the Directive has had an impact on the implementation of integrated systems. The analysis of two virtuous cases in the field of sustainability reporting, as well as a public interest entity, highlights the effects of the Directive on corporate control and data management. The findings suggest different effects on companies with different sustainability reporting experience. The study has theoretical and practical implications contributing to the literature about integrated data systems and sustainability reporting.

Keywords: Integrated data systems, Corporate reporting, Management control, Non-financial information, Directive EU/2014/95

1. Introduction

The increasing attention posed to sustainability issues combined with the growth of the economy, organizations and society recalls the investigation of

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the sustainable development goals (SDGs) (Abhayawansa and Adams, 2021; Bebbington and Unerman, 2020; Marchi, 2020a; Molinari et al., 2021). Aware of the importance and contribution of companies in achieving the goals set by the 2030 Agenda, governments aim to increase corporate accountability in socially responsible behaviour (La Torre et al., 2018; Lakshan et al., 2021). Thus, corporate reporting represents a fundamental tool to give an external account of one's practices to stakeholders and institutions (Lombardi, 2021; Lombardi et al., 2022).

In Europe, Directive 2014/95/EU (NFRD) represented an important step within corporate reporting as it required Public Interest Entities (PIEs) to report non-financial information annually (Leopizzi et al., 2019). Intending to increase the accountability of companies, the European Commission updated NFRD introducing the Corporate Social Responsibility Directive (CSRD) which includes important additions and changes by 2023 (Breijer and Orij, 2022). The new features include the increase in companies required to report non-financial information, the obligation to publish such information in the management report, as well as greater digitization and standardization of information (European Commission, 2021).

Transparent and clear information by companies requires the implementation of measurement and control system (Marchi, 2020b). Within the IT systems, the company is able to manage its data and performance in an integrated manner. Integrated data management is a useful means for creating corporate value as it enables management to be able to reduce information asymmetries (Mazzara et al., 2022). New technologies support management and the processing of ever-increasing amounts of corporate information (Galeotti et al., 2016). Some companies, for example, are using new technologies such as artificial intelligence or data analytics to improve business performance (Paolini, 2022). Few scholars have studied the topic of integrated data management (Mazzara et al., 2022).

This work aims to investigate the relationship between integrated data systems and corporate reporting systems to evaluate whether the NFRD Directive has favored the implementation of integrated data systems. From the analysis of multiple case studies, we explore the general effects of NFRD/CSRD on corporate reporting and company organization and integrated data management. The results show the effects of the legislation on several levels. In terms of changes to the control and responsibility processes, moving on to disclosure and ending with the implementation of information systems to support management control and decisions. The study analyses the best practices of two Italian public interest bodies belonging to the industrial sector.

The motivation behind this research arises from the necessity to gain a deeper understanding of how companies are integrating sustainability into their decision-making procedures. First, the trend towards sustainability reporting and the increasing demand for transparency have made it necessary for companies to integrate data from various sources to provide a more comprehensive view of their environmental, social, and governance performance. Second, integrated data systems can provide greater efficiencies in data collection, management, and reporting, resulting in cost savings and improved accuracy. Finally, there is a growing recognition that sustainable development is not only essential for the long-term survival of companies but is also necessary to address global challenges such as climate change and social inequality. Therefore, the development of effective integrated data systems and corporate reporting can help companies make informed decisions that balance economic, social, and environmental considerations, contributing to a sustainable future.

We choose to employ the qualitative methodology of case studies as it provides a distinctive opportunity to meticulously examine intricate and specific situations. This approach facilitates an in-depth understanding of integrated data systems, encompassing their processes, challenges, and organizational dynamics. As a result, it offers valuable insights and comprehensive knowledge in this field of study.

The next section reviews and discusses the literature. Section 3 describes the method, while the results are presented in Section 4. Section 5 and 6 shows findings, contributions and implications.

2. Literature review

2.1 Changes in corporate reporting system

The corporate reporting system aims to support the decision-making process such as the definition of the actions to be developed (Marchi, 2009). The reporting system takes on a broader meaning incorporating documents and reports intended for communicating dynamics and performance to the stakeholders (Pavan, 2019). There are different types of corporate reporting systems, each of which serves a specific function. They can be classified according to whether they are reports intended for external or internal subjects of the company. This type of reporting typically includes the preparation of financial statements such as balance sheets, income statements, and cash flow statements, which provide a snapshot of the company's financial health. Financial reporting systems are

crucial for investors and creditors to make informed decisions about investing in or lending to a company.

Internal reporting systems involve the communication of information between different departments and levels of management within a company. These reporting systems typically include performance reports, sales reports, and other data that help managers make informed decisions about the company's operations. Internal reporting systems are essential for maintaining efficient operations and ensuring that managers have the information they need to make effective decisions (Marchi and Trucco, 2017).

The connection between company performance and the interests of the external stakeholders is also retrieved in the need to communicate companies' results (Capurro et al., 2020). Sustainability issues must be integrated both internal and external reporting systems (Galeotti et al., 2022). Regarding the first aspect, scholars have begun to investigate the effects of sustainability in control tools. For example, some studies have investigated sustainability budgeting (Roth, 2008) or material and energy flow cost accounting systems (Jasch, 2009). Other studies have focused on new external reporting models. Pressures from stakeholders have led companies to disclose qualitative and quantitative information in addition to the mandatory accounting information included in the annual report. These different reporting models have integrated those that already exist. The architecture of the new models has contributed to increasing information capacity, providing the tools to disclose ESG information.

Dedicated standard setters create frameworks to guide companies in reporting sustainability information and deciding which stakeholders to turn to. Companies can choose whether to use, the SASB standard to primarily address investor groups or, follow the guidelines of the Global Reporting Initiative (GRI) to disseminate more wide-ranging information and involve all categories of stakeholders (Lombardi, 2021). Interest was also shown in the reporting model proposed by the International Integrated Reporting Council (IIRC). This model provides for the integration of typical financial data and ESG matrix data into a single report. Additionally, other frameworks, guidelines and standards exist, such as the Climate Disclosure Standards Board (CDSB), Carbon Disclosure Project (CDP), Gruppo di Studio per il Bilancio Sociale. The EFRAG is also developing the European Sustainability Reporting Standard along the logic of the ESG factors such as ESRS1 "General principles". ESRS2 "General, strategy, governance and materiality assessment disclosure requirements".

In this context, national and European regulators have not remained silent observing the changes taking place in the economic context (Leopizzi et al., 2020). Instead, they tried to grasp the needs of the different actors. The NFRD was created with the intent of the European regulator to increase the accounta-

bility of companies by raising awareness of the issues of sustainability and sustainable development (La Torre et al., 2020). This directive has shown only the minimum content that public interest entities had to report. Starting from 2017, large companies had to publish a non-financial statement containing information about the environment, social issues, employees, the fight against corruption and human rights.

The transition from voluntary disclosure models to mandatory disclosure models has attracted the attention of scholars to evaluate the effects produced by the law. Most studies have focused on reporting by evaluating any changes in quantity or quality. The studies agree on highlighting an increase in the amount of information to be reported (Korca and Costa, 2020; Venturelli et al., 2017). This was also caused by the requests introduced by the Directive which obliged companies to approach issues not previously discussed (Leopizzi et al., 2020). Differently, conflicting opinions were found regarding the quality of the disclosure (Agostini et al., 2022; La Torre et al., 2020). A natural continuation of the NFRD is the CSRD which acts as a tool to overcome the limits of the previous version.

Among the goals set by the CSRD is the attempt to standardize reporting and greater integration between purely financial and ESG information (Breijer and Orij 2022). The new features include the obligation to include the non-financial statement in the management report, a symbol of integration with the financial statements. This approach can be considered in agreement with that adopted by the International Sustainability Standards Board (ISSB) which provides for a deep integration within the same document of financial and non-financial information, following the approach already provided by the Integrated Report of the IIRC. Therefore, the new requests of the CSRD could lead to new changes in the organization and the business processes.

Although several studies have concerned the effects of the Directive, different organizational and management control areas are still unexplored. There is little evidence regarding the control and data management systems that appear to be at a time before the preparation of sustainability reporting.

2.2 Integrated data management

Recent events such as the recent Covid 19 crisis have made companies more aware of changing and updating their management practices (Wang et al., 2023). These events have also emphasized on the need for data integration. This need had already been underlined in previous years by business and management scholars. Scholars argue that only the adaptation of data management systems would allow an adequate representation of company

dynamics and the relationship between management and result measures (Castellano, 2011).

The quality, timeliness, and accuracy of the information provided by integrated data systems are crucial for effective and efficient decision-making. integrated data systems should be based on multidimensional variables, including financial and non-financial variables, and causal relationships between strategic factors such as objectives, operations, activities, resources, and skills. The systems should also allow for the monitoring of dynamic environments. In addition, there is a need for information integration for social control that incorporates relational control, particularly in cases of external sharing of business objectives.

Integrated data systems can also play a crucial role in integrating environmental, social and governance ESG aspects into different business processes and functions. Regulators and stakeholders pay increasing attention to the practices and communication of ESG aspects. ESG information must be periodically monitored, measured and managed before being reported (Marchi, 2020b). Integrated data systems support the monitoring and evaluation of non-financial results such as sustainability performance. Furthermore, an integrated management system is necessary to achieve a more comprehensive and interactive approach to sustainability management, and to avoid thematic gaps or inefficiencies in operational resources (Nawaz & Koç, 2018). Integrated data systems also provide the management with useful data used for the preparation of strategies and prospective plans as well as annual sustainability reports (Asif & Searcy, 2014). Although scholars have highlighted the strengths of the implementation of such systems, it is noted that integrated systems are associated with increases in costs and management difficulties (Bomheuer et al., 2020). Therefore, these changes are currently the preserve of large companies only.

Due to technological progress and new digital tools, the scientific debate is animated by discussions regarding the use of these new technologies and new techniques for integrated data management functions to performance measurement (Mazzara et al. 2022). Scholars assume the new technological means as fundamental to improving performance as they allow for the extraction and processing of an increasing amount of data. The use of new technologies (e.g. artificial intelligence, blockchain, big data, internet of things) in the management and processing of information allows for better management of data which is transformed into information to support corporate management (Galeotti et al., 2016). The use of IT solutions is directed to increase efficiency, especially at the operational levels and intervening on routine activities. With the growth of managerial skills, information systems acquire different importance. Its application of it has increased the potential of accounting data to support business deci-

sions (Marchi and Mancini, 2009). Some scholars have highlighted the power of Big Data by proposing a framework that could be used by companies to integrate historically and forecast sustainability data together with corporate data, adopting decisions oriented towards the development of responsible and economically successful operations (Hämäläinen & Inkinen, 2019).
However, scholars have also highlighted some critical issues, such as the publication of few studies on the implementation of integrated data management systems requiring revision of the organizational structure and intellectual capital as well as the contribution of top management (Mazzara et al., 2022; Paolini, 2022). Therefore, the research question is as follows:

RQ1: Has the NFRD had an impact on integrated information systems?

3. Methodology

To answer the research questions, an analysis of multiple case studies was conducted (Yin, 2009). The latter is a qualitative method used by accounting and management scholars to analyze complex phenomena, such as integrated data management (Marchi, 2011). A qualitative methodology was used since this method gives importance to aspects that quantitative methodologies do not allow to be enhanced, such as the organization-specific level (Caputo et al., 2017). Several studies have used this method to study the integration of sustainability into business dynamics (Molinari et al., 2021).

Multiple case studies involve the examination of multiple cases, each of which is considered a separate entity, and the identification of patterns across cases (Flynn et al., 1990). This approach is particularly useful when the phenomenon of interest is complex and cannot be adequately explained by a single case. By studying multiple cases, we can identify common points, differences, and underlying causal mechanisms across cases, which helps to develop a more comprehensive understanding of the phenomenon under investigation. Furthermore, this method allows to the mitigation of some risks of generalisability of findings from that single case (Parker & Northcott, 2016).

The two cases analyzed were chosen from the list of companies obliged to report the non-financial statement according to Directive EU/2014/95 according to the Commissione Nazionale per le Società e la Borsa (Consob) list. To address our research question, we analyzed two companies that are significantly different from each other. Company A operates in the industrial sector, while Company B is in the healthcare sector. Furthermore, we deemed it important to evaluate the effects of the Non-Financial Reporting Directive (NFRD) on com-

panies with different approaches to sustainability reporting. On one hand, Company A has extensive experience in sustainability reporting and managing ESG data and information, having voluntarily published reports before 2016, making them one of the few virtuous companies. On the other hand, Company B began communicating ESG information with the introduction of the NFRD, and is therefore gaining experience in this field.

To reduce the risks and objectivity issues we have combined different data ranging from interviews to documents, articles and websites. A semi-structured interview was conducted in Italian language with members of the company's management and here translated by the authors. Moreover, a comprehensive interview questionnaire was formulated through a meticulous brainstorming exercise, where all plausible questions related to the research question were documented. Subsequently, the questions were refined and revised to eliminate any superfluous elements, and the scholarly literature was referred to ensure the question list was exhaustive and pertinent to the study.

To ensure the reliability of the data, the interview involved all the authors and was fully recorded and transcribed. Regarding data analysis, two researchers carried out the coding of the records to minimize elements of subjectivity and ensure the impartiality of the process. A content analysis was therefore carried out in order to identify elements of similarity or dissimilarity regarding the topics investigated. To support the researchers, the NVIVO 12 software was used in the coding and analysis phase. Finally, a Word cloud was performed as a synthesis of the analysis process. It allows you to visually highlight the keywords resulting from the interview. The authors translated the answers from the interviews.

Table 1 – Main data source

Data Source	Type of data	Use in the analysis
Semi-structured interviews	Interview with ESG directors Company A: 60 min Interview with directors of Company B: 50 min	Gaining insights into the concept of integrated data systems in a corporate context; comprehending the organizational implications and the impact on integrated data systems brought forth by the NFRD.
Internal documentation	Internal documents	Mitigating the risks associated with the rhetoric of the observations and enhancing the data gathering process through the collection of additional information.
Public documentation	Companies' websites and documents	Enhancing the credibility of interview-based narratives through support, integration, and cross-referencing

4. Results

Results reflect the growing trend of companies acknowledging the importance of ESG factors and taking steps to integrate them into their decision-making processes. Companies are making progress in incorporating ESG factors into their operations; there is still room for improvement in terms of setting specific targets and measuring progress. It also highlights the challenges that companies may face in developing and implementing ESG metrics and targets, as well as the need for a long-term commitment to sustainability.

The comparison between the two cases shows how the two companies analyzed responded in different ways and at different times. Both companies have decided to adopt IT data collection systems. This aspect symbolizes that there is awareness of the relevance of these systems within corporate management and control. This affirmation is confirmed by what was answered by Company A:

> *"[…] It is currently unthinkable to be able to understand ESG phenomena without the implementation of systems that support you both in the collection and in the analysis[…]"*

Furthermore, it was also pointed out that:

> *"For the more structured companies it wasn't particularly dramatic. As early as 2016 we had set up an IT data collection system that collected the Group's data, with the same rules for all. We published the data with the financial data (we were the third company to publish the DNF)."*

The system implemented has facilitated the data collection process, bringing various advantages also at a strategic and organizational level. The system adopted allows for the standardization of the process along the entire value chain. Such systems were also needed to unify information for all of the company's locations around the globe.

The same cannot be claimed regarding data management and control systems of Company B. It argues that:

> "*We are implementing year-on-year metrics to measure ESG factors, although we are still having difficulty defining some targets. [...] We started a process 4 years ago and we plan to conclude it in the coming years*"

The firm argued that over the years they have achieved the goals they had planned in terms of ESG metrics. The support of qualified personnel (such as the entry into the company of the new Chief Sustainability Officer and other

collaborators with experience on ESG issues) has been instrumental in accelerating this implementation. The Company A has equipped itself with an integrated system to integrate financial and ESG information.

> *"The applications are different but we have control points where there is data that is collected in two different flows. We have specially created control points.*"

It implies that the company has established a system to ensure that the data collected is accurate and reliable, which is crucial for effective decision-making. By having control points, the company can track data flows and identify any discrepancies or errors, enabling them to take corrective actions promptly. Furthermore, this mechanism makes it possible to assign responsibilities to specific subjects and to trace the person responsible in the event of an investigation.

Otherwise Company B:

> *"The systems do not interface. We have created a separate module that does not interface with other systems."*

From the discussion with company B it emerged that they are aware that the implementation of such systems can represent another important step towards the full integration of sustainability in the business. Although over the years the company has achieved increasingly significant results in the field of measurement and control of ESG phenomena in relation to the reporting obligations of the NFRD, it is not yet ready to bring innovations also in the field of data management.

This made it possible to use this data to integrate ESG information into different assessments and into different internal and external reporting systems. Through an integrated data system for the company A it is possible to complete the analyzes in different areas:

> "*[…] risks, budgets, impairment, innovation and technology plans. […] we have also added ESG criteria on evaluations on initiatives to be allocated internally or developed externally. […] If sustainability is not integrated in all areas, it is not possible to have a forward-looking perspective*"

Emphasis is still placed on control systems. IT systems and digitization are important as they facilitate the work of management control. However, in order to govern the changes taking place and so that innovative tools can contribute to the efficiency of processes, the company must increase its intellectual capital.

"*More than digitization, it all starts with a control system that the company must equip itself with. You can do it by running Excel files, but if you want to do it well, you can do it using IT applications. However, there must be a reader (natural person) who must have the sensitivity to interpret and evaluate the information.*"

Indeed, Company A has envisioned various applications of new technologies, harnessing the computational power of tools such as artificial intelligence (AI). AI is utilized to proactively identify any inefficiencies and mitigate environmental impacts. Furthermore, data intelligence tools and big data analytics have been employed to conduct a supplementary examination of impact themes, thereby enhancing the assessments of material topics resulting from management-stakeholder engagements.

5. Discussion

The case studies highlighted that corporate reporting is based on performance measurement and data management systems. These systems allow on the one hand to carry out an accurate internal control and on the other hand to be able to disclose truthful information in step with the new needs of stakeholders. The centrality of control is confirmed by Figure 1 which shows the Word Cloud created using the answers obtained during the interview. The control is the most relevant keyword ("control").

Figure 1 – Word Cloud

Control can be more effective if supported by integrated data management systems. Integrated data systems can be key to integrating sustainability into all

business functions and levels (Molinari et al., 2021). Next to the word control, we noticed how "planning", "indicators" and "internal" are among the most used words. Integrated data systems are necessary to be able to consider ESG aspects also within corporate planning and strategies.

The digitization of processes and new technologies can provide companies with modern tools to manage the challenges that ESG aspects pose. Integrated data management compared to more rudimentary tools has the advantage of being able to measure and control the phenomena along the entire value chain and with standardized information for all company functions. Furthermore, companies that have internally implemented an integrated data management system could receive benefits from the updating of the Directive and the entry into force of the CSRD. By providing for the inclusion of the non-financial statement in the management report, an integrated system would facilitate communication between the two interdependent spheres (financial and non-financial). In particular, it could be a strategic choice for companies to develop Sustainable Enterprise resource planning systems (S-ERP). The S-ERP systems have the function of integrating data relating to sustainability along the entire value chain (Chofreh et al., 2014). As a holistic solution, such systems support businesses to provide and process comprehensive sustainability data (Chofreh et al., 2020).

The information integration supported by the new technological systems, however, requires the development of corporate human capital. It is good to specify how new technologies support decisions but do not replace them. Furthermore, the employees must be equipped with the necessary skills to implement systems of this type and subsequently understand and interpret the information outputs.

However, it should be noted that this is an important step towards which even companies with less consolidated foundations in terms of management, control and communication in the ESG area must strive. The analysis of two companies obliged but with different experiences and maturity has found that the integration of sustainability and systems is a process that needs its time. Therefore, the introduction and updating of the Directive is to be welcomed as it is a factor that is accelerating the changes within companies to welcome ESG values with greater awareness and accuracy.

6. Conclusions, limitation and future research

This study aims to investigate the relationship between integrated data systems and corporate reporting. Specifically, the study evaluated the potential effects of NFRD on data management. The importance placed on the issue of sus-

tainability by the actors of the economic system is to modify the model of value creation (Adams, 2017). Several scholars have stressed the need for an integrated risk and performance management approach to increase opportunities for shared value and to achieve short and long-term objectives consistent with the paradigm of sustainability and sustainable development (Marchi, 2020b). In this perspective, the NFRD and the CSRD want, through reporting, to sensitize an increasing number of companies to adopt sustainable behaviors. Consequently, the companies had to make investments and changes on several levels to equip themselves with a technical and organizational structure suitable for reporting ESG information. Social and environmental sustainability must be managed within the company system before being reported externally.

The companies that have decided to integrate sustainability within their corporate functions have equipped themselves with new tools to manage the amount of information. The results of this work highlight the effects produced by NFRD on two Italian companies. NFRD, in its first version, has accelerated the changes especially in the management and business processes. On the side of integrated data management, the results differ from the state of maturity of the company regarding ESG issues. The company with the most experience in terms of sustainability has long since launched a process of management and integration of ESG data. Companies that have only recently embarked on the process of more accurate measurement and management of ESG facts. It was underlined how necessary an integrated information system is for greater completeness and correctness in the measurement and analysis of corporate performance. The best practice analyzed seems a necessary factor to include ESG issues in the internal and external reports.

The study has theoretical and practical implications. Regarding the first aspect, this work contributes to the literature on integrated data management and sustainability reporting (Paolini, 2022; Wang et al., 2023). This study aims to investigate the relationship between the integration of integrated systems and reporting systems. The results show that integrated data management is also a necessary aspect of collecting and processing qualitative and quantitative information. Moreover, the study provides new evidence on the internal effects of non-financial reporting regulation. The study confirms some implications attributable to the NFRD and provides new evidence about the function of quality control and information transparency. Integrated data management, also supported by new technologies, increases the timeliness and accuracy of information.

The study also has practical implications. The research provides insights into the importance of adopting an integrated approach to data management and reporting and highlights the benefits of doing so. Companies can streamline their

processes, reduce costs, and improve the accuracy and reliability of their sustainability data. Additionally, an integrated approach can help companies to identify and manage risks, improve their decision-making processes, and enhance their reputation and stakeholder trust. However, the comparison of the results referring to the two case studies showed that the implementation of such systems for smaller companies requires more time due to the high financial and organizational costs.

NFRD initially had some positive implications in terms of data management, but these implications have not been entirely satisfactory. Since the Commission has decided to intervene in the digitization of reporting through the CSRD, the regulators can use these results in order to evaluate whether to intervene also to stimulate the integration of data to favour the integration of sustainability.

The present study is not without its limitations. Firstly, the sample consists of companies within a single country limiting the generalizability (Parker & Northcott, 2016). This could limit the generalizability of the findings to companies in other countries or regions with different legal and regulatory frameworks. Different cultural, social, and economic factors may affect the implementation of integrated data management and corporate reporting in other contexts. Furthermore, the sample size of the study was relatively small, which may limit the representativeness of the cases analyzed. It is possible that some other companies or industries have different experiences and challenges related to integrated data management and corporate reporting that were not captured in this study. Also, the study focused mainly on the perspectives of company representatives and did not include the views of other stakeholders such as investors, regulators, or civil society organizations.

There are also opportunities for future research. Future research could expand the sample size and include companies from various countries and regions to better understand the effectiveness of integrated data management and reporting practices. Finally, future research could also explore the potential of emerging technologies, such as blockchain and artificial intelligence, in facilitating integrated data management and reporting practices.

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