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Digital IT transformation in sustainable development reporting in Poland

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Abstract

Investments in the environment, society, and governance (ESG) have increased significantly, and the number of global assets managed sustainably has more than doubled over the past decade. This trend is expected to continue until 2030. Such financial data is positive, but given the United Nations' statement on the "climate crisis" and "climate survival" in contemporary society, further acceleration of ESG investment growth is necessary. There has been a lot of negative feedback on ESG in recent years. The key message is that ESG frameworks and guidelines are not problematic; rather, the problem lies in practical decision-making in companies. The importance and obligation to report on ESG activities is growing. The problem is not only the awareness of everyday activities but also the IT and AI tools that can help entrepreneurs collect and report good practices. This article, reviewing available market results, provides a basis for further empirical research on the actual scale of non-financial reporting.

Keywords: sustainability, IT, AI, ESG, entrepreneurs, reports.

Introduction

Modern technologies are essential for collecting and processing information to report sustainable development. This requires software changes created for enterprises. Using the latest solutions will not yet guarantee the reliability of ESG data itself. The number of enterprises seeing a business case for ESG activities in Poland has been growing, even threefold, in recent years. Capgemini's "A World in Balance" research indicates that two-thirds of business decision-makers worldwide see that the benefits of sustainable development outweigh the costs, regardless of the reporting obligation. At the same time, companies still do not cope with reporting on sustainable development initiatives, especially in measuring and collecting data. It is emphasized that the key threat to sustainable and lasting development of the activities of enterprises is "short-sightedness", i.e., making decisions and striving for the best results in the short term but suboptimal in the long term, suboptimal for both the enterprise and the broader social and ecological system. Investments that pay off in the short term are mainly incremental, not transformative, and relying on what pays off in the short term can lead to fleeting, temporary results.

Enterprise foresight requires, among other things, redefining the expected results of the enterprise, which in the long term are formulated about a reality that is less knowable and controllable and, therefore, must go beyond short-term financial metrics to those that relate to shaping the system's resilience. Currently, in its basic assumptions, almost every business model recognizes and uses digitalization, both in internal interaction processes, with customers and partners, and with other stakeholder groups. The development of modern enterprises should be linked to implementing sustainable development. The digital transformation

of enterprises, digital technologies, the 5G network, the Internet of Things, edge computing, artificial intelligence, and robotics are emphasized. They are to form the basis for new products and production processes and new business models based on fair data exchange (European Commission, 2021). The Sustainable Development Goals set out in the EU's Europe 2030 strategy indicate the direction of development of the EU economy and define the scope of work of EU institutions for the coming years.

Digitalization is essential in achieving the SDGs, which can accelerate and streamline their implementation. Using digital opportunities for the benefit of the EU economy while protecting the privacy of its citizens and the natural environment is the main priority of the EU's digital strategy until 2030. This article identifies the importance of digital transformation and artificial intelligence in implementing sustainable development in enterprises. The aim of this article is to identify gaps in digital transformation and artificial intelligence in implementing sustainable development in Polish enterprises. It identifies reporting tools available on the Polish market, but little known in practice.

This article focuses on the small scale of reporting by Polish enterprises. It first presents existing results regarding the scale of ESG reporting by large enterprises. Furthermore, the article analyzes IT and AI tools supporting the reporting of non-financial ESG data in Poland. This article contributes to further research. The year 2025 is a landmark year for many large enterprises in the European Union, it is the first year in which they will be required to report information related to ESG (Environmental, Social, and Governance), i.e., sustainable development, social responsibility, and corporate governance. This obligation stems from the Corporate Sustainability Reporting Directive (CSRD), which was adopted by the European Parliament at the end of 2022. This article, reviewing available market results, provides a basis for further empirical research on the actual scale of non-financial reporting.

Parameters of Sustainable Development of Enterprises

Enterprises play a vital role in striving for sustainable development. They are one of the most important sources of growth on a local, regional, national, and global scale, as well as employment. At the same time, enterprises encounter many difficulties in meeting the requirements: they operate in an environment of regulations and laws that can either support or inhibit their development. Small and medium-sized enterprises account for about two-thirds of all jobs in industrialized countries and have an even greater share in developing countries. In recent years, they have been the primary source of newly created jobs, but they are characterized by low productivity and quality of work. Enterprises face a challenge in which they should strive for development while accepting responsibility for actions that affect the immediate social and environmental environment (Herman, 2022).

The concept of sustainable development changes modern enterprises' business perspectives and strategies. These are moving away from an attitude focused solely on achieving economic profit and moving towards socio-economic order (Stawicka, 2024). The concept of a sustainable enterprise results from the emergence of the sustainability paradigm. This means developing a company in a changing environment and striving for balance in the economic, social, and ecological areas (Guandalini, 2022). Of course, economic results are an indispensable factor of success, but with maintaining social and ecological responsibility.

Appropriate data collection is the key to successfully implementing the strategy and ESG reporting. Especially when it comes to data related to adverse effects affecting sustainability factors, which are referred to as PAI - Principal Adverse Impact, this type of data includes, among others (Chabot & Bertrand, 2023):

- Climate and environment indicators: greenhouse gas emissions, carbon footprint, activities that hurt biodiversity-sensitive areas, emissions to water, or the hazardous waste and radioactive waste indicator.

- Indicators on social and employee issues, issues related to respect for human rights and combating corruption and bribery: compliance with the principles of the Global Compact initiative and the OECD Guidelines for Multinational Enterprises, control of the gender pay gap, gender diversity of board members, or exposure to controversial types of weapons.

- Indicators applicable to investments in government bonds and bonds issued at the supranational level - these concern the greenhouse gas emission intensity of the countries in which the bonds are invested and the number of countries in which the bonds are invested and which are affected by violations in the social sphere.

The number of standards and guidelines that should be used when creating reports is constantly growing. Greenhouse gas emissions are reported, as well as the level of achievement of decarbonization goals. Companies are currently taking on record commitments in greenhouse gas emissions in response to investor and market pressure. The carbon footprint is calculated in three scopes, selected depending on the purpose of calculating the carbon footprint by a given company (Golińska-Dawson et al. 2025):

- **Level 1:** Includes direct emissions resulting from the combustion of fuels in stationary or mobile sources, owned or supervised by the company, and emissions resulting from technological processes or escaping refrigerants.

- **Level 2:** Includes indirect energy emissions from the consumption of imported (purchased or supplied from outside) electricity, heat, process steam, and cooling.

- **Level 3:** Includes other indirect emissions generated throughout the value chain, e.g., from producing raw materials or semi-finished products, waste management, transport of raw materials and products, etc. The challenge here is not to set goals but to take actual actions to enable steady progress in implementing the commitments described in the above scopes. Hence, creating a work program, an appropriate database, a reporting system, and the involvement of all stakeholders inside and outside the organization is important.

Recently, the prevalence of non-financial information disclosure in Poland has increased. Currently, over 180 entities in Poland disclose non-financial information, while the WIG-RESPECT index has been replaced by the new WIG-ESG index published on September 3, 2019. Importantly, in the case of WIG-ESG, it includes a total of 60 companies from the indices with the highest market capitalization and their weights in the index are adjusted based on the ESG ranking and the assessment of the application of the principles of the Best Practices of Companies Listed on the WSE (Kawecki, 2023).

WIG-ESG includes all companies with the highest capitalization, and only their weight in the index is adjusted continuously for issues related to sustainable development. The WIG-ESG index included 60 companies with the largest capitalization on the WSE, but not all companies in the WIG-ESG index disclosed information on sustainable development in their reports (Figure 1).

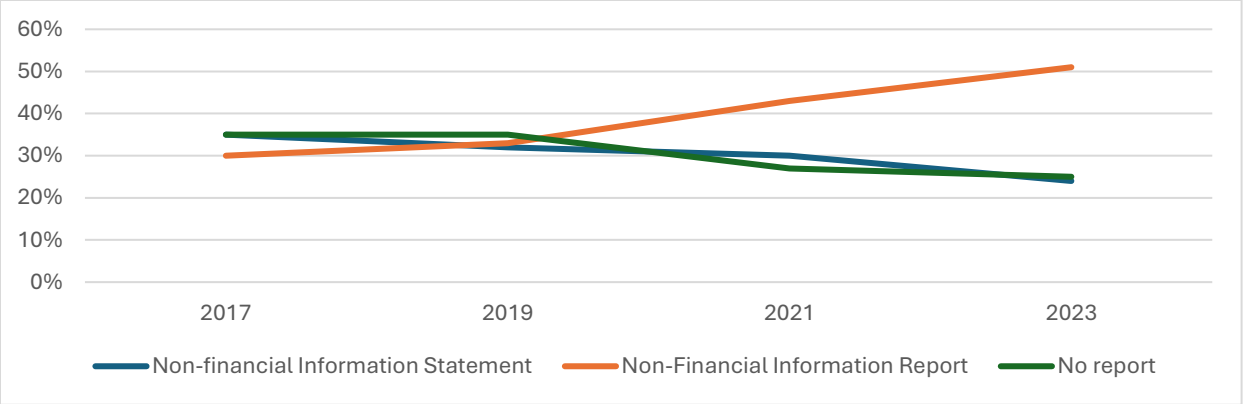

Figure 1. Sustainability disclosures by WIG-ESG index entities in 2017-2023
Source: Annual Reports of WIG-ESG Companies in Poland 2017–2023.

The results in Figure 1 indicate that 21 of the surveyed companies (35%) did not prepare a non-financial report in any form in 2017–2019. In 2021, this number was only 16 companies (27%). In individual years, this form of reporting on non-financial information has become increasingly popular, with as many as 25 companies (41.67%) in 2021 and 31 companies (51%), compared to 18 companies (30%) in 2017, opting for the report form. As indicated in the research (Kuberska & Kawacki, 2023), non-financial indicators in the environmental field, which are disclosed by most industrial companies in Poland using GRI standards, include data on: energy consumption by the organization (GRI 302–1), total water consumption (GRI 303–1), total weight of waste (GRI 306–2).

ESG (Environmental, Social, Governance) reporting is a significant challenge for businesses in Poland. There is a lack of ready-made infrastructure and data. Many companies do not yet systematically collect ESG data. Environmental data (e.g., CO_2 emissions, water consumption) and social data (employee turnover, gender equality) are often scattered across departments or inaccurate. There is a lack of consistent IT tools for collecting, monitoring, and reporting non-financial information. Furthermore, the new European Sustainability Reporting Standards (ESRS) are extensive, detailed, and difficult to interpret. Companies must conduct a double-materiality analysis, assessing both the environmental and social impact of their activities and the reverse. Understanding ESG risks and integrating these issues with strategic management is also essential. This requires the involvement of multiple ESG departments, which is not limited to PR or CSR, as reporting requires collaboration between departments such as finance, HR, operations/production, compliance, and management. The reporting obligation ensures data credibility.

Unlike previous, more "soft" CSR reports, ESG data is now subject to external audits. This means companies must ensure the quality, completeness, and source evidence of all ESG indicators. Preparing for reporting involves additional costs, such as employee training, IT system implementation, external consulting (lawyers, ESG auditors), and potential process restructuring. Businesses are beginning to feel the pressure of time. The 2024 report must be published in 2025, a very short time for preparation, especially for companies just starting out. Delays could mean legal sanctions or reputational damage among investors, customers, and partners.

There is pressure and the risk of "greenwashing." A too superficial approach can result in accusations of faking sustainable development efforts. ESG reporting is not just a matter of compliance with regulations but a profound transformation of company management. For many organizations, this requires a change in organizational culture, building new competencies, and rethinking stakeholder relationships.

IT and AI transformation in reporting

There is increasing talk about trends related to the automation of ESG data collection, ongoing management, and reporting. ESG reporting requires transparency and a comprehensive assessment of the company's environmental impact. In this context, BIG DATA telemetry technology is becoming a key tool. By monitoring environmental parameters, employee working conditions, or supply chain management, companies can provide comprehensive data necessary to assess compliance with ESG requirements. According to the analysis GRI Sustainability and Reporting Trends in 2025, reporting of the future will take place in digital form and almost live. The report of the future will not be a document prepared once a year but a communication mix based on dynamically available data that goes beyond the report itself.

The development of technology has accelerated significantly, with over 460 solutions identified in the area of reporting. ESG management and reporting tools are being developed by many startups, as well as the largest companies, including Microsoft - Cloud_for_Sustainability or SAP - ustainability_Control_Tower. However, the challenge today is not only to create a tool but also to properly implement AI technology and integrate it with data and a sustainable development strategy. The SAP report Digital-Driven Business. Development in the Face of Industry 5.0 shows that this may be a key challenge for business in the coming years and even decisive for its future. Only 50% of surveyed companies declare that their current IT systems process data that can be useful for measuring carbon footprint and ESG strategy. However, these resources already have the potential to support sustainable development (SAP Report, 2024).

In the IT industry, ESG is becoming very important. Modern technologies are necessary for their collection because this data comes from various sources. For example, information on entities in which investments were made using the European ESG Template (EET) comes from an external asset manager. In contrast, the calculation of indicators for various types of investments may be based on data available in tools such as the MorningStar service. Conducting ESG projects indicates that an important aspect is the collection of reference data from the point of view of reporting obligations for financial institutions that are part of capital groups. Models are designed to process data from various source systems so that it is possible to reprocess them. This forces the IT software market to modify the tools supporting companies in reporting because many of them were not adapted to the specific context of a given organization, which is crucial in the case of ESG indicators. According to the authors of the EY report, Technology as a support for sustainable development is a big challenge because ESG-related data is scattered throughout the organization, and external data must be acquired and combined with internal data sets (Angelova et al. 2024).

Defining Key Performance Indicators (KPIs) is a challenge. Organizations do not yet have much experience with ESG KPIs, which requires implementing a rigorous methodology for determining the right KPIs, identifying the primary data sources, and performing the necessary data transformations to calculate the appropriate indicators. It is difficult to determine which data is to be collected and integrated with analytical systems. At the same time, this is a condition for adapting to new regulations, but also for making more thoughtful investment decisions and better adapting to the expectations of various stakeholders. But also to achieve tangible benefits, such as using IoT to save energy. Tracking indicators such as energy consumption, raw materials, and waste processing ultimately reduces costs. In addition, it minimizes the risk of exposure to penalties, fines, or accusations of greenwashing.

Ultimately, most key applications and systems will probably serve ESG analyses. Artificial intelligence will increasingly enter this area, helping to standardize and verify data from many sources, providing an instant, consistent, and transparent picture of ESG results. However, its specificity also creates the risk of data distortion and falsification, so the results must still be checked and verified by experts. Relying on biased AI algorithms may turn out to be one of the greatest risks associated with the use of modern

technologies to build strategies, report, and invest in the context of ESG. Companies manage the distribution of renewable energy certificates and collect detailed comparative data on other energy sources. An equally important, although not entirely mandatory, aspect is the collection, organization, and monitoring of scope 3 greenhouse gas emissions that arise in the company's value and supply chain. Another popular mechanism for reducing the carbon footprint is the compensation of greenhouse gas emissions through investments in global projects based on nature conservation. All of the initiatives, as mentioned earlier, need an appropriate solution. Poland's first sustainable development reporting tools following the CSRD directive and ESRS standards are SmartHead, Diaphane, IBM Envizi, Envirly, Greenomy, APlanet, and Velma ESG.

Table 1. Available IT tools for ESG reporting in Poland
Source: own study based on CSR info, https://www.csrinfo.org/ranking-narzedzi-raportowania-esg-2024/

Parametry	APlanet	IBM Envizi	Smart Head	Diaphane	Envirly	Greenomy	Velma ESG
Supports CSRD/ESRS standard	YES	YES	YES	YES	YES	YES	YES
Possibility to download the application to your phone	YES	YES	YES	YES	NO	YES	NO
Automatic saving of entered data	NO	YES	NO	NO	NO	YES	NO
Entering attachments	YES	YES	YES	YES	YES	YES	YES
Access to data from previous years	YES	YES	YES	YES	YES	YES	YES
Service in Polish	NO	YES	YES	YES	YES	NO	YES
Tracking changes	YES	YES	YES	YES	YES	YES	YES
Polish language version	NO	YES	YES	YES	YES	NO	YES
Easy and intuitiv to use	YES	YES	YES	YES	YES	YES	YES

The available tools indicated in Table 1 are very rarely used in ESG reporting practice in Poland. However, IT and artificial intelligence tools will probably become an increasingly important element in business models. Using the software, it can be seen that the data for reporting are data from media suppliers, external suppliers, service companies, and systems within the organization, such as financial and production systems. It is also necessary to consider all information flowing from the value chain, such as emission data or ESG surveys, and manually entered data, which are not without significance for the entire process. All this, supported by market data, processed using connectors that have been adapted to various types and formats of data, allows for optimal conclusions. All the described data is integrated into a single system of records, in which it is processed using a metrics engine or an algorithm engine, depending on what we want

to calculate and can be viewed in any perspective, any units, and according to how we want to view and disclose it depending on the needs. The software can collect and process over 500 types of data related to sustainability, and the collection is constantly growing, depending on the needs of specific clients. This data concerns many areas and processes, from basic to more specific to the entity.

Discussion and Conclusion

ESG plays its role in the transition to a low-carbon economy, where the key message is to leave no one behind; this is key for countries that are developed and developing. A failure to have functioning ESG processes for the corporate world will lead to more economic inequality. Hence, ESG can be a beacon for improving just socio-economic outcomes in society. Artificial intelligence has become an inseparable element of modern business. The latest trends include the use of deep learning algorithms in the analysis of large data sets and the automation of work processes. AI systems in customer service, with particular emphasis on chatbots, revolutionize customer communication. In the digital transformation era, companies increasingly seek AI solutions to keep up with changing trends and gain a competitive advantage. The potential of artificial intelligence is already being used to suport company CSR activities and relates to many different areas of sustainable development.

In terms of environmental protection, AI can influence the sustainable development of a company by supporting processes such as: monitoring and analyzing the impact of a company on the natural environment, energy efficiency, circular economy. Most Polish companies think about the natural environment when looking for savings. The possibility of remote work, which has become necessary during the pandemic, is combined with a pro-environmental initiative. On the other hand, companies declare that in the future, they will develop an ESG strategy, especially in the area of climate protection, corporate governance, and impact on the social environment, undertaking the integral development of IT and AI systems that analyze and report data on gradually expanded activities in the field of sustainable development.

Most Polish entrepreneurs, IT suppliers, and integrators conduct unsystematic activities in ESG. Consequently, their offer of IT tools supporting the practice and reporting of sustainable development factors is also partial and still does not meet the growing needs. The offer of IT and AI tools for non-financial ESG reporting is minimal. There is a lack of IT solutions. The existing digital gap is also indicated within the EU about the world leaders in digital transformation and within the member states. The economies of the EU Member States are gradually improving their level of digitalization; there is a progressive development of those countries that, in recent years, had a low level of digitalization and have now made a jump of over 50%. It is worth noting the growing popularity among scientists, but a significant research gap should be filled by intensifying research in this area. According to a report by Crowe Poland and Envirly (2024), only 14% of companies in Poland declare they are fully prepared for CSRD reporting. As many as 35% do not know when they will need to begin. Another study indicates that 24% of companies declare readiness, and most organizations do not have a designated ESG person or team; 68% of respondents have not assigned such a role.

The impetus to implement IT tools is often strongly linked to the level of organizational preparedness; without a designated leader and strategy, technologies are implemented less frequently and less effectively. The Inspired study (2021) shows that only 11% of IT companies in Poland pursue a strategic approach to ESG, and only 5% measure their carbon footprint. Most operate haphazardly, which effectively limits the use of IT tools. According to Statista (2024), the most commonly used ESG reporting tool is spreadsheets (Excel). Furthermore, a significant number of companies use data management systems such as SAP. In a

PwC report (covering the retail and consumer goods industry), most companies admit they are not technologically ready for CSRD/ESRS requirements. In discussions, users mention the most commonly used global tools, such as Envizi, and similar systems are also beginning to appear in Poland (as SaaS platforms supporting CSRD). Importantly, many companies believe that processes are inconsistent due to departmental fragmentation and manual data entry. Non-financial reporting generates much debate and controversy. Therefore, the overview in this article is relevant for further analysis of the non-financial reporting trend not only in Poland but also in other European Union countries.

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