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AI-Based Solution for Sustainability Tracing for Companies

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ABSTRACT

Many companies look for novel ways to trace their operational sustainability. The application of AI to analyze and make sense of the big data the company holds represents one promising approach for this aim. The authors study how one can set and design an AI-based solution for improving the sustainability of complex business processes and decision-making in companies of different types. First, they provide a general analysis of current frameworks for measuring adherence to sustainability goals for companies, then they present a conceptual framework and architecture design for an AI-enabled sustainability service for companies. The implications of our research suggest that AI can provide distinct functions: (a) automation: taking big data from different departments and analyzing them with the aim of tracing the sustainability of the company; (b) support: to help decision-making and create relevant insights for stakeholders that are coherent with defined sustainability decision criteria. To the authors' knowledge, no previous research has provided analysis and design of such AI solution for companies.

KEYWORDS

Artificial Intelligence, ESG (Environment, Social, and Governance), Information System, Information System Design, Knowledge Management

INTRODUCTION

Sustainability as a concept has gained momentum in recent years. Firms increasingly commit to sustainability in their business processes and operations. Media attention puts even more pressure on businesses to pursue sustainability, raising questions on how to establish and measure progress towards sustainability goals.

Companies have been adopting environment, social, and governance (ESG) rules to measure adherence to sustainability in their existing business operations and keep up with these changes. ESG means adopting and incorporating environmental, social, and governance principles into company decisions (Van Duuren et al., 2016; Ertz, 2020; Hahn & Lülfs, 2014). Why is ESG so important?

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According to recent research (Unruh et al., 2016), ESG-focused companies are more highly valued, and ESG aspects contribute heavily to financial sustainability and performance. Companies focusing on ESG issues have a better reputation and brand image, and they also have improved risk management and control of long-term risks (Xie, 2019; Pedersen, 2020).

The United Nations (UN) and an international group of institutional investors introduced the ESG process. Responding to the increased relevance of environmental, social, and corporate governance issues in business practices, they proposed creating, by 2030, a world free of poverty, hunger, and disease. These efforts align with European Union (EU) directives that work to establish standards and benchmarks to improve company transparency in ESG reporting (Arvidsson & Dumay, 2021). Businesses understand the importance of tackling ESG goals, yet ESG remains a relatively new area, so companies need time to discern how to integrate ESG into their functioning.

On a strategic level, it is difficult for a company to tackle every aspect in all categories of ESG at a time. Thus, decision-makers must prioritize areas to focus on at any given time and determine what threshold points they should start with. Therefore, they must select the most essential aspects and ESG rules.

Several barriers to ESG have been identified. The most important is limited knowledge and expertise on ESG issues since the concept is relatively new (Hedstrom, 2018; Porter et al., 2020). Moreover, businesses sometimes fail to consider ESG aspects that may significantly impact them, and they may see a limited short-term return as a disadvantage. The EU is now moving to improve transparency obligations. Publicly quoted companies must disclose specific information about their approach to integrating sustainability risks and considering adverse impacts on sustainability (van Oostrum, 2021). Yet, these companies barely do this, and even when they do, they do not provide evidence that the presented results apply to their operation.

The role of journalism and reporting on ESG should not be underestimated. Findings from a recent cross-country study show that journalists play an essential role as informants and educators when writing about sustainable finance (Strauß, 2021). The research finds that the reporting is event-driven, putting even greater pressure on companies since such events put their brand at stake.

Greenwashing is another crucial aspect in this context. The ESG data provided by companies are often unaudited, and sustainability report data may not be reliable. Several studies have examined various greenwashing behaviors within the ESG dimensions and the circumstances under which companies engage in greenwashing (Del Bosco & Misani, 2016; King Andrew & Lenox Michael, 2001; Yu et al., 2020). These studies agree that companies exposed to greater scrutiny—that is, adequate supervision of their working operations—are less likely to engage in ESG greenwashing.

At the same time, businesses have begun to devote effort to exploiting big data as a novel opportunity to gather insights into the state of their enterprise from data in their possession (Manyika et al., 2011). Although artificial intelligence (AI) has gained popularity, the use of machine learning (ML) and AI in ESG is not well researched. Many organizations want to use AI to improve their decision-making, but few have managed to do so effectively (Macpherson et al., 2021). The problem of how to do this properly for various industries in different domains is a challenging one. The question of how to analyze unstructured data, compare ESG-relevant information for each company categorized by ESG-special classifications (with the help of ML and AI), and thus generate insight for ESG goals adherence has, to our knowledge, yet to be researched.

One of the challenges is how to tune "sensitivity" to different E, S, or G metrics for the particular domain and effectively translate this into ML and AI decisions (Macpherson et al., 2021). Machine learning can better spot and identify the E, S, and G indicators, or at least detect them from priory data. However, the next concern is classifying the conformance indicators for relevant industries (Crona, 2021). Another issue involves company culture and whether it focuses on ESG compliance. This may represent a hurdle where intention for ESG compliance is lacking (Tang, 2020).

On the analytical side, advances in AI have revolutionized the way businesses operate and work with data. AI, ML, and automation have become ubiquitous and essential to organizational

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