

Sustainability issues in project management : A systematic literature review

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Abstract

The increasing integration between digital transformation and sustainability values profoundly influences project management. Not only does digitalisation make processes more efficient, but it also enables ESG objectives to be attained. In our study, we conduct a systematic literature review (SLR) to examine the impact of digital technology and sustainability on the field of project management. Drawing on keyword networks and text mining analysis, we reveal the most significant trends in terms of research and pinpoint the areas in which digitalization enables sustainable development in projects. Using the PRISMA methodology, we reviewed English-language articles from 2018 to 2023 in the Scopus and Web of Science databases. With VOSviewer's network analysis and text mining, we investigated the intersection of digital innovation, sustainability, and project management. Keyword clustering identified seven prevailing thematic topics, including key terms such as "change management," "sustainable development," and "agile," highlighting the increasing importance of ESG considerations in project management practices. As a continuation of our previous research, we conducted an in-depth analysis of the 5th and 6th topics and aim to address the following research questions:

- What are the main trends and patterns emerging in the international literature regarding the integration of ESG principles into project management?
- Based on keyword network analyses, which keywords play a key role in the relationship between ESG and project management?
- According to the results of text mining analyses, which thematic areas deserve special attention in the context of sustainability, organizational change, and change management within project management?

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The research outcomes indicate that corporate strategies increasingly adopt methods that consider ESG compliance at the organizational level, particularly in supply chain management, digitalization in construction, and risk management. ESG compliance is becoming more widely integrated into project management to establish sustainable and competitive corporate operations. The research has the potential to pave the way for exploring the practical application of ESG approaches in industries and project environments.

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1. Research Gap

In recent years, the integration of ESG (Environmental, Social, and Governance) principles into project management practices has gained momentum. While numerous studies explore either the sustainability aspect or digital transformation within projects, there is still a lack of comprehensive research that explicitly examines how these elements intersect and reinforce each other. Specifically, few studies have offered a structured, bibliometric analysis of this intersection, leaving a gap in understanding the critical drivers and enablers that facilitate sustainable project outcomes within the context of digitalization.

2. Research Problem

Organizations face increasing pressure to adapt their projects to ESG requirements while simultaneously embracing digital transformation to remain competitive. However, the literature is fragmented, making it difficult to form a coherent view of best practices, challenges, and success factors. Therefore, the research problem lies in identifying which ESG-related concepts are most crucial for project management and how these interact with technological and organizational transformation processes.

3. The Objective of the Study

Given this gap and problem, the primary objective of this study is to (1) systematically review and analyse relevant literature on digital transformation and project management through the lens of ESG principles, (2) uncover the main thematic clusters via keyword network analyses, and (3) provide detailed insights into select clusters (Topics 5 and 6) that appear pivotal for practical applications of ESG in project

management. By focusing on these key clusters, we aim to generate actionable recommendations for both scholars and practitioners seeking to integrate ESG considerations into digital-era projects.

In order to obtain answers to our questions, we posed the following research questions:

- What are the main trends and patterns emerging in the international literature regarding the integration of ESG principles into project management?
- Based on keyword network analyses, which keywords play a key role in the relationship between ESG and project management?
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4. Research Methodology

The purpose of this chapter is to offer a comprehensive overview of the applied research methodology by presenting its background and explaining the structure of the PRISMA diagram. In the following subsections, we will demonstrate how these elements integrate into the methodology of the systematic literature review (SLR).

4.1. Background

The primary goal of the comprehensive Systematic Literature Review (SLR) is to find answers to the research questions based on existing sources. This approach stands out from traditional methods because it offers a rigorous, reproducible, and transparent procedure, ensuring the reliability of the results. The foundation of an SLR is a well-designed research question that is both relevant to the topic and feasible to investigate. When searching scientific databases, we use carefully selected keywords and filtering criteria that closely align with this research question. From the resulting set of publications, we then select studies to be included according to specific eligibility criteria [1],[2].

In order to ensure the transparent application of the SLR method, we developed a research procedure that also includes algorithmic support for text mining. We implemented this using our own Python scripts running on the Google Colab platform [3]. To explore of the subject area, we relied

on the PRISMA guidelines [4], in order to ensure that our study is both transparent and well-structured. In the initial phase, we carefully defined the screening criteria for database searches, then compiled the initial list of articles based on the bibliographic references from external sources. After preprocessing the dataset (e.g., removing duplicates), we carried out preparatory text-mining steps on the article abstracts such as tokenization, stemming, stop-word removal, and lemmatization. By examining this corpus from different perspectives, we generated text mining outputs, such as topics, models, word clouds, and bibliometrics (e.g., author and thematic networks). Using the visualizations created with the Biblioshiny and VOSviewer software [5], we gained a comprehensive overview and deep insights into the research field, identifying key directions and emerging trends [6].

In this study, we narrowed our search in the Scopus database to the “Business, Management, Accounting” subject area and, in the Web of Science database, to the “Business” and “Management” subject areas, without using any closing (limiting) terms [7],[8]. The goal of selecting these terms was to identify scholarly sources that address changes, developmental directions, and innovations in project management. We collected the data on december 2, 2023, specifically seeking publications that discuss the combination of “digital transformation” and “project management.” We restricted our search to English-language scientific articles published between 2018 and 2023, giving us the opportunity to compare the periods before, during, and after the COVID-19 pandemic.

4.2. *PRISMA Chart Based on the Literature*

We successfully filtered a total of 379 articles: 192 from the Scopus database and 187 from the Web of Science. Using an algorithm that supports bibliometric analyses, we removed duplicates and then organized the remaining articles using the Mendeley reference management program. In the initial phase of the analysis, we did not exclude any articles, as we sought to gain a comprehensive view of every relevant aspect of the research area, endeavoring to include as many potential information sources as possible.

As a result, the set of articles used in our analysis contained a total of 321 articles, from which we identified seven topics. Following this topic-based analysis, we narrowed our focus to the main areas in which elements relevant to ESG, sustainability, and change management emerged. These elements primarily appeared in Topic 5 (58 articles) and Topic 6 (44

articles), where sustainability and organizational change aspects were strongly represented. Accordingly, we concentrated our detailed examination on 10 articles to gain deeper insights into the integration of ESG principles in project management and their impacts.

5. Literature Review: Findings of the Study

5.1 Review of Keyword Networks

Figure 1 presents a network map of the 100 most frequently occurring keywords filtered from the Scopus database. The purpose of this figure is to visually illustrate the connections and groupings among these keywords, as well as the overlaps between different areas. In analyzing the map, we excluded the terms “project management” and “digital transformation” to highlight the keywords that are particularly significant from both an ESG and a project management perspective. As a result, concepts such as

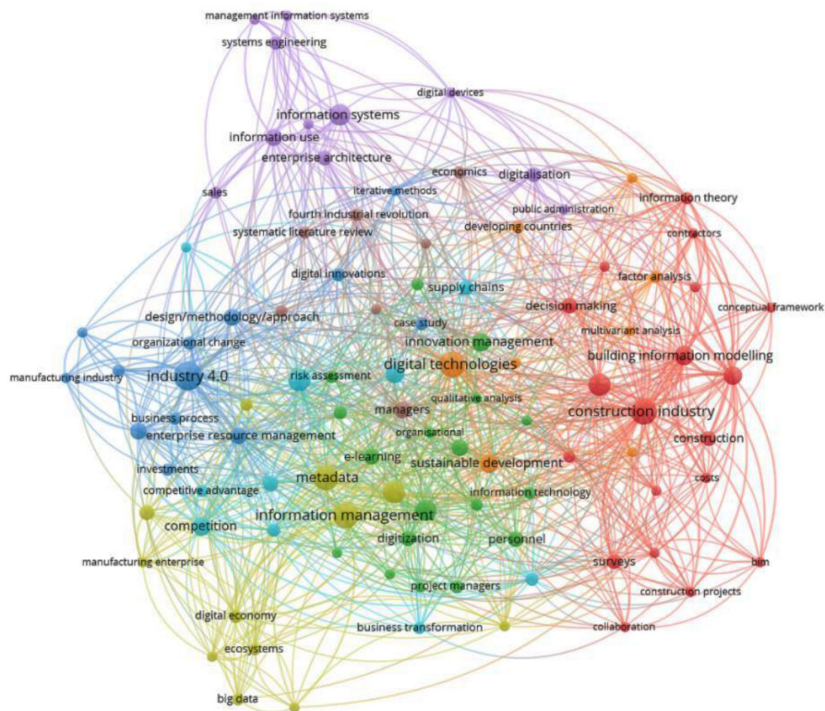


Figure 1

Keyword mapping for literature from the Scopus database [5].

“sustainable development,” which emphasizes the role of sustainability in projects; “innovation management,” underscoring the importance of integrating new technologies and methods; and “project managers,” indicating the pivotal role of project leaders in achieving sustainability and innovation goals, came to the forefront. These keywords clearly demonstrate that project management is increasingly incorporating ESG considerations and that sustainable development is no longer just an additional factor, but rather a defining element of project success.

However, the keywords from the Web of Science were grouped into eight clusters. The terms in the yellow cluster, such as “change management,” “governance,” “impact,” and “transformation,” clearly indicate that organizational changes and data-driven decision-making are critical factors in achieving sustainability goals, particularly in the areas of corporate governance and strategic transformation. The green cluster keywords, including “organizational change,” “digital innovation,” “success,” and “firms,” suggest that aligning digital innovation with organizational transformation is indispensable for realizing sustainability. This all highlights that sustainable development is not merely a technological or economic issue but also heavily depends on effective change management and the appropriate application of innovation strategies.

5.2. *Investigation of Topics*

Through a bag-of-words-based frequency analysis of the 321 publications in the corpus that had abstracts, we gained an initial impression of the main directions of the entire content. Before the analysis, we compiled a topic-specific stop-word list to filter out commonly used terms related to projects and management (e.g., “project,” “management,” “digitalisation”), allowing more subtle information to come to the forefront.

As the next step, we applied text-mining preprocessing techniques (e.g., cleaning, tokenization, stop-word removal, stemming, lemmatization, bigram creation, TF-IDF) and then used the Latent Dirichlet Allocation (LDA) algorithm to identify the probabilistic topics within the publications. After determining the ideal number of topics, the abstracts could be grouped based on their content similarity and characterized with keywords. In our analysis, two different grouping approaches (into 5 and 7 topics) yielded similarly high coherence scores. To name these thematic areas, we used Microsoft’s Generative AI service [9].

From a comprehensive topic analysis and a word-cloud-based examination of the entire corpus, we identified certain focus areas requiring more in-depth exploration. These include sustainability issues and the integration of ESG (Environmental, Social, Governance) principles into project management, as well as organizational changes, change management, and organizational development challenges. Of the seven topics, we conducted a more detailed analysis of Topics 5 and 6. Our choice was based on the fact that both topics centre on issues related to technological advancement, innovation, business model transformations, and change management, which are directly associated with responsible governance, environmental and social sustainability, as well as the challenges of organizational development and change management. They also highlight that today's technological innovations and transformations are closely tied to sustainability goals and the organizational framework of project-based work.

Based on the analysed studies, Topic 5 mainly focuses on corporate change management processes and the challenges of gaining acceptance for them. Programs aimed at reducing user resistance in digitalization initiatives can also provide guidance for project managers' human resource management: the adoption of new technologies in projects is greatly facilitated if their benefits are clearly perceivable to organizational members. According to [10], in order to achieve this, it is advisable to rely on project management systems that take into account the specific characteristics of project-oriented companies and flexibly adapt to the conditions of digital transformation. Establishing a collaborative organizational environment is also crucial for both addressing challenges and ensuring project success [11]. These authors point out that senior management plays a key role in creating a supportive organizational atmosphere while they also try to minimize resistance and uncertainty. Besides, several authors of studies in the topic concerned highlight that incorporating sustainability considerations into change management processes can enhance long-term corporates. In a comprehensive analysis examining four decades of project management trends, it is emphasized that the integration of technological innovations, organizational resilience, and sustainable operations may play a key role in the future development of project management [12]. In line with this, the authors in [13] found that understanding how digital innovation teams operate, particularly in terms of collaboration, knowledge sharing, and the establishment of common goals, is crucial for introducing sustainable business practices. When managing technological change, collaboration between strategic

decision-making and corporate governance is a decisive factor in the success of sustainability initiatives [14]. Digital solutions such as Building Information Modeling (BIM) and the Internet of Things (IoT) can directly affect the economic, environmental, and social aspects of projects, especially in the construction sector, where introducing technological innovations and aligning the efforts of all stakeholders is crucial. Accordingly, this perspective highlights that project management must consider not only the technical aspects of digital transformation but also the integration of sustainability, environmental, and social considerations in order to provide corporate operations that create long-term values.

Studies categorized under Topic 6 suggest that companies must rely on disruptive technologies to reshape their business models and innovation schemes in order to keep up with digital enterprises [15]. This process is not solely a technological challenge; in line with the social pillar of ESG, it also requires the development of human resources and the assurance of employee well-being. The author in [16] points out that in the context of the Fourth Industrial Revolution, global technology management plays a pivotal role in maintaining corporate competitiveness, and emphasizes the importance of continuous learning, retraining, and encouraging innovation. At the same time, digital transformation can only be truly successful if organizations strategically prepare their workforce and also consider the needs of broader segments of society. Establishing a “digital transformation laboratory” can contribute to sustainable digitalization in both developed and developing countries, as well as in small and medium-sized enterprises, as revealed by recent research [17]. This is achieved by simultaneously improving technological infrastructure, enhancing employee competencies, and encouraging an open and inclusive mindset. Therefore, companies take both market and societal perspectives into consideration when integrating new technologies. When introducing digital government solutions and regulations such as the Single Digital Gateway Regulation, it is worthwhile to review the impact of implementation from the standpoint of citizens and employees alike. All of this aligns well with the view of the authors in, who argue that responsible corporate practices and a deliberate digitalization strategy are not merely issues of being competitive but form the foundation of corporate operations guided by ESG principles. Thus, the adoption of disruptive technologies can help companies enhance their innovation capabilities while also assisting in prioritizing the creation of social values and establishing a sustainable work environment.

6. Conclusions and Implications of the Study

The findings uncovered during this research have highlighted that the integration of ESG principles and project management is becoming an increasingly prominent trend in the international literature. Emphasizing digital innovation and sustainable development, along with the roles of change management and corporate governance, clearly indicates that the incorporation of environmental, social, and governance (ESG) factors in project management is no longer just a supplementary component but a critical success factor. Project managers are increasingly responsible for achieving sustainability goals, requiring them to align digital innovation solutions with organizational transformation processes. Governance and strategic transformation play a crucial role, especially in data-driven decision-making and change management. Sustainability is no longer an “extra” component but rather a fundamental element in long-term project success. During the analyses, concepts such as “sustainable development,” “change management,” “innovation management,” “digital innovation,” and “project managers” took centre stage, indicating that sustainability, organizational change, and technological advancement have become integral parts of project management practice. By conducting an in-depth analysis of Topics 5 and 6, we were able to identify the most significant relationships in these two specific areas. This targeted approach allowed a more thorough understanding of the connection between ESG considerations and project management.

Overall, the research results confirm that integrating ESG principles into project management is not just a passing trend but a crucial pillar for future, long-term corporate success. The coordinated handling of sustainability principles, innovation, and organizational change management will be indispensable for maintaining competitiveness and achieving positive social and environmental impacts.

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