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SUSTAINABLE PROJECT MANAGEMENT CONCEPT DEVELOPMENT AND RESEARCH DIRECTIONS REVIEW

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Purpose: The dynamic economic changes in recent years have made the principles of sustainable development gain more and more importance and there is a great need to maintain a balance in the social, environmental, and economic dimensions. This has also been observed in project management, whereby the concept of sustainable project management plays an important role in both practice and science. In recent years, there has been a significant increase in scientific publications on the concept of sustainable project management. The article presents the assumptions of sustainability in a project and the identification of research directions in this area. The study aims to present the results of the literature review and answer the two research questions: which research areas related to sustainable project management dominate the literature and what are the further research directions in the field of sustainable project management?

Design/methodology/approach: The study was conducted based on a literature review in the field of sustainable project management and sustainability in project management. Scientific articles indexed in the Scopus database, published before 2022, were used. A keyword analysis was carried out, on the basis of which subject areas related to sustainable project management were distinguished, and the most cited articles were reviewed to extract recommendations for the directions of future research.

Findings: The literature review, taking into account sustainable project management, show that project lifecycle, project success, and risk management are dominated research topic in the articles. Further research directions suggested in the literature indicate, inter alia, to extend the scope of research on sustainable project management to different countries and sectors.

Originality/value: The literature review is based on the most recent publications. Moreover, in addition to the traditional literature review, keywords were analyzed and other research directions were analyzed, which was rarely seen in publications that focused mainly on the synthesis of conclusions.

Keywords: sustainable project management, sustainability in project management, research directions.

Category of the paper: literature review.

1. Introduction

The consequence of the ongoing changes in the internal and external conditions of the functioning of modern organizations are dynamic changes in the existing management concepts and new management problems. Among the factors causing changes within the organization, one can distinguish the continuous improvement of management models and organizational structures, e.g. as a result of process automation. Changes in the external environment of the organization are more noticeable and result primarily from the development of technology, digitization, and their effects are also felt in the social, economic, and environmental spheres.

The above-mentioned phenomena are only examples of changes caused by the Fourth Industrial Revolution. According to Jarosz et al. (2020) Revolution 4.0 presupposes the changes connected with industry digitization, automation, robotization, data processing, and intelligent systems. On the other hand, Coşkun et al. (2019) distinguish specific technologies that allow us to understand the concept of the Fourth Industrial Revolution, e.g., Internet of Things, Internet of Services, or Industrial Internet.

In recent years, the development of technology and the Internet significantly influenced changes in the economy from a global perspective. Currently, especially during the Covid-19 pandemic, there has been a large increase in remote services, such as making purchases remotely from anywhere in the world. This, in turn, leads to increasing demand for services related to the storage and transport of goods. The given example is perfect for confirming that the changes resulting from Revolution 4.0 leave their mark on the social (changes in people's habits, social exclusion), economic (non-cash payments, changes in the labor market), and environmental (exhaust emissions and environmental pollution) spheres. These changes are very dynamic and cause an imbalance in the ecosystem of contemporary organizations, hence the interest in the concept of sustainable development has been growing in recent years.

Several important events contributed to the creation of the concept of sustainable development, e.g., the convening of the 1992 UN Conference in Rio de Janeiro, known as the Earth Summit. As a result of the conference, The Earth Charter or Agenda 21 were formulated. The first was a declaration of values and principles that were intended to “awaken in all people a new sense of global interdependence and shared responsibility for the welfare of the entire human family, greater community of life and future generations”. Agenda 21 presents economic and social problems as well as the roles and tasks of individual social groups in the management and protection of natural resources (Płachciak, 2021).

There are two approaches to the concept of sustainable development in the literature. The basic approach assumes the coexistence of social, economic, and ecological order, which is also called the triad of sustainable development. A system constructed in this way will become unbalanced, for example, in a situation where economic development is the result of overexploitation of the environment. A more extensive concept of sustainable development is

presented in terms of capital and orders. It focuses on the quality of life by managing human capital (social order), economic capital (economic order), natural capital (economic order), social capital (institutional order), and capital integrating all other capital groups (spatial order) (Adamowicz and Dresler, 2006; Trzepacz, 2012).

Over the years and as a result of numerous studies, the concept of sustainable development has been developed and is not only a starting point for environmental protection but has become, above all, a motivating factor for the creation of sustainable business models, which result in profitability and innovation of services (Carboni et al., 2018).

Contemporary organizations increasingly apply management by projects, i.e., targeted and unique activities, limited in terms of time and budget, and focused on creating business value (Kerzner, 2017). Over the years project management is still developed as a field of research studies and organizational approach (Turner et al., 2013). There is a growing interest in the discipline of project management in both education and business. Most universities currently educate students in this field, but also the profession of a project manager is becoming more and more needed in the labor market.

Organizations and managers are currently facing the challenge of maintaining order in the economic, social, and environmental spheres. The concept of sustainable project management seems to be a response to the needs resulting from the ongoing changes. A 2020 UK survey found that 83% of 200 UK business leaders describe sustainability as a business opportunity that should be seized. In addition, among the most important measures used to assess the return on investment from sustainable practices, respondents cited: the success of new, sustainable products and services (56%); cost reductions (42%), and profitability (42%) (Smurfit Kappa, 2020).

Bearing in mind the above foundations, the article aims to present the assumptions of sustainability in project management and to identify the dominant research areas and research directions due to the concept of sustainable project management, based on a literature review from Scopus. This review is aimed to answer two main research questions:
RQ1: Which research areas related to sustainable project management dominate the literature?
RQ2: What are the further research directions in the field of sustainable project management?

The remainder of this article is organized as follows. The following chapter presents the general concept of sustainable project management. Then, the method used in the literature review is described. The section entitled “Results” presents the analysis of the content of the research articles. Then, the section “Discussion” answers the research questions posed and shows them against the background of previous studies by scientists. The section entitled “Summary” presents the main conclusions of the literature review and further research directions.

2. Sustainable project management

Sustainable project management derives from the concept of sustainable development, which dates back to the 1950s (Waas et al., 2011). An important event for the development of the concept of sustainable project management was the 22nd World Congress of the International Project Management Association in 2008 organized in Italy. According to McKinlay (2008) speech during the congress, the future of project management depends on "taking responsibility for sustainability" by project managers (Silvius and Schipper, 2014). As noted in the introduction section, this concept began to play a significant role and more and more researchers developed it. The definitions of sustainable project management reported in the literature in 2009-2012 were presented by Silvius and Schipper (2014). Literature analysis shows that sustainable project management is often understood as Sustainability in Project Management or Project Sustainability Management (PSM). In addition, scientists also use the term Green Project Management (GPM). This article presents the chosen definitions that appeared in the literature during the last years (Table 1).

Table 1.
Sustainable project management definitions

Authors	SPM definition
Carboni, Duncan, Gonzalez, Milsom, Young (2018)	"the application of methods, tools, and techniques to achieve a stated objective while taking into account the project outcome's entire lifecycle to ensure a net positive impact environmental, social, and economic impact"
Armenia, Dangelico, Nonino, Pompei (2019)	"the managerial practice aiming at pursuing project objectives by maximizing economic, social, and environmental benefits through the proactive involvement of stakeholders, the consideration of the extended life cycle of resources, processes, and effects, and continuous organizational learning"
Brzozowska, Pabian, Pabian (2021)	"an activity that consists in planning, organizing, leading, and controlling, carried out in accordance with the principles of sustainability, as a result of which the project team achieves project goals"

Source: own elaboration.

The idea of sustainable project management results directly from the assumptions of organizational balance. "Organizational balance consists in the mutual adjustment of relations within-organizational and between the organization and the environment" (Koźmiński, 1991). Sustainable project management is about managing change in policies, processes, resources, assets, or organizations, taking into account the six principles of sustainability in the project and its result (Silvius and Schipper, 2014). The principles present the following issues:

- Social balance, ecological and economic – in order to contribute to sustainable development, organizations should meet all "three" pillars of sustainable development: social, environmental, and economic;
- Short-term orientation and long-term – sustainable organizations should consider both the short-term and long-term consequences of their actions and not just focus on short-term gains;

- Local and global orientation – sustainable development must be coordinated action on several levels, from global to regional and local;
- Orientation on values and ethics – sustainable development supports organizational ethics and decision-making respecting universal principles by preventing negative impacts on society and the environment;
- Clarity and accountability – the organization is responsible for its policies, decisions, and actions and their impact on the environment and society;
- Economic prosperity – sustainable organizations should adhere to strategies that balance the needs of stakeholders, including the needs of today's society and future generations.

The adoption of the principles of the concept of sustainable development in business brings many benefits for enterprises. These include gaining market advantage and increasing trust in the brand, more effective resource management (e.g., reducing energy and material consumption), or increasing employee commitment and morale. In addition, sustainable management of the organization helps to improve relationships, among others with investors, suppliers, customers, and even government bodies (Carboni et al., 2018; Gasiński and Piskalski, 2009; ISO 26000). However, among the most tangible benefits of sustainable operation of the enterprise are growing profits, which are the result of investments of stakeholders who perceive the sustainable operational ability of the company and the development potential (Wang et al., 2020).

The importance of sustainability in project management is now emphasized in books and scientific articles, but standards and guidelines are becoming more and more common. The best-known today is the GPM P5 standard and PRiSM methodology described by Carboni et al. (2018). The P5 Ontology relates to sustainable development in project management while maintaining a balance between the five aspects: People, Planet, Prosperity, Process, and Products. It also supports the methodology of Projects integrating Sustainable Methods (PRiSM). Among key products of PRiSM methodology, the Business Case or Sustainability Management Plan can be distinguished. Maintaining the principles of sustainability in project management is also possible with the use of the IPMA Project Excellence Model, which assumes balance in three areas: people and goals, processes and resources, project results.

3. Methods

It is claimed that sustainable project management is a constantly developing field of research (Silvius et al., 2012). This is due to the constantly growing number of scientific publications in this field, but also practice shows a constantly growing demand for training and certification related to it (e.g. in Poland an increase in the number of Accredited Training Organization of Green Project Management has been observed).

In the article, the systematic literature review was used to select, analyze and synthesize (Tranfield et al., 2003). Data selection consisted in searching for articles related to the concept of sustainable project management. The Scopus database, which is one of the largest and best-known scientific databases in the world, was selected as the data source.

The terms "sustainable project management" or "sustainability in project management" were used as search strings. The search results for scientific publications were limited to articles published in scientific journals until 2021.The Scopus search key was as follows: (TITLE-ABS-KEY ("sustainable project management") OR TITLE-ABS-KEY ("sustainability in project management")) AND PUBYEAR < 2022 AND (LIMIT-TO (DOCTYPE, "ar")).

As of March 03, 2022, a search found 65 results (see Appendix) that match the above search command.

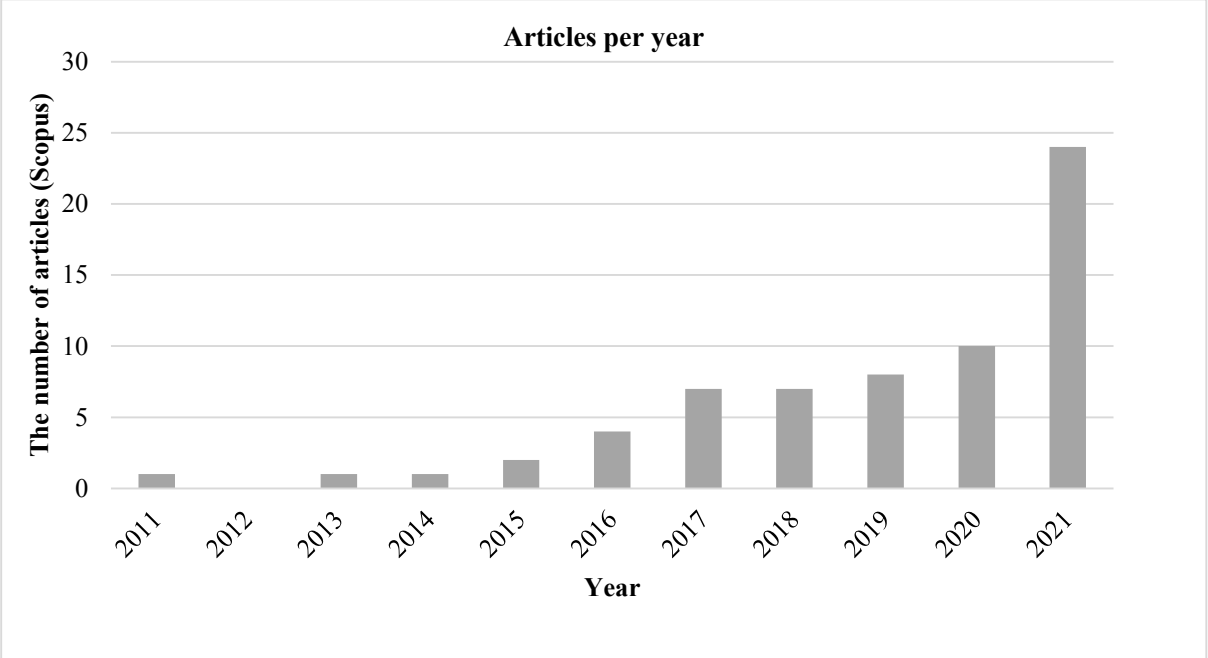

Figure 1. Overview of articles by year in the sample. Source: own elaboration.

The data presented in Figure 1 confirms that in recent years there has been a significant increase in the number of scientific articles on sustainable project management.

The analysis of the literature was carried out in two stages to be able to answer research questions: keywords analysis and deep qualitative analysis of the most cited articles.

The first step involved the author's keywords analysis to identify key research areas described in the publications in the Scopus database. The analysis allowed to isolate 199 different keywords in the Scopus database based on the selected documents. The keywords analysis did not take into account "sustainable project management" and "sustainability in project management", as they were the main criteria for the selection of the documents. Also, general keywords as "sustainability", and "project management" were excluded. All analyzed keywords have been counted and presented in Figure 2.

Figure 2. Author's keywords – word cloud. Source: own elaboration.

The word cloud shows all analyzed keywords. Keywords presented in larger font appeared most often in the analyzed articles. They may indicate the dominant thematic areas and trends discussed in scientific publications in the context of sustainable project management.

As the second part of the study, an in-depth qualitative analysis of scientific articles was carried out in terms of research findings and further research directions. For this purpose, from a sample of 65 scientific articles, those with a number of citations of at least 10 were selected. Therefore, 22 articles were used in the further analysis. The highest number of citations is 160. Each article has been carefully analyzed. On this basis, the main research findings and further research directions were synthesized.

4. Results

This paragraph presents the synthesis of the results of the keywords analysis and in-depth analysis of the articles. It provides the findings of the research questions of the article: "Which research areas related to sustainable project management dominate the literature?" and, "What are the further research directions in the field of sustainable project management?". For each question, an overview of the scientific documents' content is presented and a general synthesis is provided.

Research areas

The analysis of keywords in 65 analyzed articles in the field of sustainable project management indicates the complex nature of this concept. The most common keywords were (appearing in min. 3 articles): sustainable development, project success, triple bottom line,

project manager, risk management, developing countries, project, behavior, Q-methodology. Based on the analysis of abstracts, it is concluded that some keywords indicate the scope of the research (e.g., risk management) and some - the selection of methods used in the study (e.g. Q-methodology).

As a result of the analysis of keywords, Table 2 was developed, which presents thematic areas and the scope of research in the field of sustainable project management in the analyzed articles. Keywords were grouped into clusters with a similar thematic scope.

Table 2.
Keywords clusters

Cluster	Keywords sample
Environment and sustainability	ecodesign, environmental protection, environmental impact, environmental sustainability, green projects, sustainability, sustainable development, sustainability concepts, sustainability constructs, sustainability drivers, sustainability factors, sustainability governance, sustainability indicators, sustainability maturity assessments, sustainability practices, sustainability tools, sustainable tunnel
Project Management	project control, project definition, project delivery, project design, project leadership, project lifecycle, project management plan, project success, project planning and budgeting, project scheduling, project stakeholders, project value management, public project, social projects, vulnerability of the project, Agile Project Management, Green Project Management, collaboration, Corporate Social Responsibility, decision making, design cost estimation, indicators, management and evaluation, management of innovative project, optimization, risk management, risk assessment, value management, waste management
Project manager	attitude, behavior, competences, human, multitasking, skills, project manager, project owner, stimulus patterns
Industry	biogas, biotechnology, construction engineering project, construction industry, energy, IT project, digitalization, engineering big data, extractive industries
Research location	developing countries, Pakistan, Iran, Taiwan
Research methods	Analytic Hierarchy Process, Fuzzy AHP, Fuzzy ANP, Fuzzy DEMATEL, Correlation Network Analysis, PROMETHEE, Q-Methodology, Systematic Literature Review, Metaheuristic Algorithms, Stochastic Frontier Analysis, Structural Equation Modeling

Source: own elaboration.

After the analysis of titles and abstracts, as well as keywords presented in the word cloud (Figure 2) and clusters developed in Table 2, the following research areas were identified by the author as the most dominated: project lifecycle, project success, risk management. Below is an overview of recent research in the field of sustainable project management in terms of the identified thematic areas.

Project lifecycle. According to the keywords' clusters, Project Management is the most complex research area in terms of the number of keywords. Most of them relate to the processes present in project management and the project life cycle. The authors of the analyzed articles often raised issues related to the definition, planning, scheduling, financing, and delivery of projects. For instance, Chow et al. (2021) described that sustainable project management positively influences project planning. Furthermore, the topic of project lifecycle was studied in the context of construction management waste in Jordan. The authors of the study proved that the causes of waste generation are related to all phases of the project life cycle (Zighan and Abualqumboz, 2021).

Project success. In the context of sustainable project management, some of the analyzed scientific articles were devoted to the criteria and success factors of the project. Klaus-Rosińska and Iwko (2021) concluded that stakeholders management is one of the guidelines for sustainability based on the analysis of project success in small companies in the construction sector. Furthermore, project success is linked with value for stakeholders by a modern approach to managing projects (Mrzygłocka-Chojnacka et al., 2021). In their research, other authors dealt with the problem of exploring and validating the effects of megaprojects affecting sustainable project management. The survey data showed that the success of the project is influenced by factors such as environmental protection, international relations, and economic recovery (Xiaolong et al., 2021). Additionally, the studies based on the identification of key factors of sustainability in project management in the United Arab Emirates confirmed that there is a significant positive link between sustainable project management and project success (Watfa et al., 2021).

Risk management. Risk analysis is a very important part of project management, especially taking into account the aspect of sustainability. One of the analyzed articles describes a model of sustainable risk management in IT projects based on expert research. The author presented inter alia the processes of risk management compared to the standard GMP P5 (Trzeciak, 2021). Risk factors and sustainable project management were also a topic of interest of Jang et al. (2021). The researchers proved that risk factors may be parameters from bidding documents of construction projects, which are the field for developing sustainability. As environmental impact is one of the pillars of sustainability, also in project management, scientists have attempted to evaluate risk techniques that can be used to assess accidents in the environmental impact process (Fuentes-Bargues et al., 2020).

Research directions

In-depth analysis of the most cited articles in the sample provides information about main research findings and researchers' recommendations for further research directions. Table 3 shows the analysis results.

Table 3.
Research directions in the field of sustainable project management

Authors	Citation count	Research findings	Research directions
Martens and Carvalho (2017)	160	Using the systematic literature review method and survey of project managers, the authors identified key factors of sustainability in project management: Sustainable Innovation Business Model, Stakeholders Management, Economic and Competitive Advantage, and Environmental Politics and Resources Saving.	The authors suggested to use of the variables disclosed in the study in other sectors for parameterization in project management as an assessment tool; performing the validation and structuring of sustainable development variables (TBL); incorporation of the concept of resilience to develop a model combining themes, persistence, and resilience in project management.

Cont. table 3

Kivilä et al. (2017)	138	The authors proved that sustainable project management is carried out using not only indicators but an overall control package in which controls are used that are different for different dimensions of sustainability.	The authors' recommendation was to explore practices to help organizations manage projects and develop stakeholders' networks following sustainable development. Also, they suggested making a map of mechanisms of control for sustainability between various types of projects.
Kiani Mavi and Standing (2018)	119	The authors reviewed 41 critical success factors of sustainable project management and group them into project-related, project management-related, organization-related, external environment-related, and sustainability.	According to the authors, interpretive structural modeling techniques can be implemented to study the interrelations between critical success factors and to create a multi-level hierarchical model of sustainable project management structure in the construction sector.
Gilbert Silvius et al. (2017)	96	The authors used Q-methodology to study the decision-making process in project management under the sustainability conditions and revealed four dimensions of the decision-making process: people and quality, people and risk, time and cost, quality, time and risk.	The authors indicated to continue the study in other sectors and make a comparison of results according to the differences between organizations. Furthermore, they suggested measuring different phases of project management in the decision-making process.
Silvius (2017)	92	The author provided the results of the research that confirmed the hypothesis that sustainability can be understood as a new school of thought in project management. The article highlights the features of the school of sustainable development in project management: including projects in social perspective, stakeholder management approach, use of triple bottom line criteria, and adopting a value-based approach to project management.	The author's recommendation was to study the specificity of a sustainable school of managing projects in the context of various industries. Additionally, it was suggested to analyze the research methodologies of studies on sustainability in project management. Sustainable development should not be studied in general.
Brones et al. (2014)	81	The authors showed that in scientific articles the concept of sustainable project management and ecodesign is presented in a limited way. They stressed that environmental requirements are not consistent with project management, which affects the effectiveness of ecodesign in the product development process.	The authors recommended that studies be conducted in various organizations to investigate project management variables relevant to ecodesign. The recommendation also looked at the analysis of project management approaches that could improve the environmental performance of product development.
Martens and Carvalho (2016)	72	Through the analysis of case studies, the authors investigated how organizations implement the principles of sustainability in project management and how sustainability influences project success. They showed that companies are concerned about sustainability in project management and that public sector organizations are more concerned about the social dimension than others.	The authors suggested extending the case studies and exploring individual business niches to understand their strategies.

Cont. table 3

Dobrovolskienė et al. (2017)	58	The authors investigated how dimensions of sustainability influence decision-making by project managers. They found that project managers take into account only some factors, for example, health and safety. The study also showed that project managers focus more on the principles of sustainable development in project management than other members of the project teams.	The authors recommended studying how sustainability influences other project management phases, for example, project implementation.
Silvius and Schipper (2015)	39	The article provides a maturity model for sustainable project management as a tool for assessing and developing the implementation of sustainability principles to projects.	Further research directions are not known.
Martens and Carvalho (2016)	35	The authors identified the main dimensions and variables of sustainability in project management and explored their impact on project success.	The authors suggested conducting further research for a better understanding of the impact of sustainability on project success. It is recommended to use the AHP method and increase the number of experts in the study.
Yu et al. (2018)	33	The authors present a Construction Project Sustainability Assessing System (CPSAS), which covers four levels with pillars, categories and sub-categories, and indicators. They concluded that CPSAS can be used for stakeholders in construction projects.	It was suggested to test the proposed model for inter alia in industrial and ocean construction projects.
Yu et al. (2018)	26	The authors explored sustainability in project management through the prism of planning in engineering projects. They proposed and assessed sustainable project planning in the construction industry.	The authors recommended focusing further research on the impact of sustainable project planning on project outcomes and to explore differences due to various cultures.
Silvius and Schipper (2016)	26	The article presents the model for adopting sustainability in project management. It shows the relationship between projects, project success, and sustainability. The authors identified nine sustainability dimensions that influence project management and six criteria that allow measuring the success of projects.	The authors of the article recommended conducting empirical testing due to the perception of the relationship between sustainability and project success by project managers and other stakeholders.
Yuan et al. (2019)	21	Based on the study conducted in China, the authors proved that the behavior of project owners has a positive impact on building information modeling and the perceived usefulness has a significant influence on behavioral intentions. The results of the study also show that social influence is not significant for perceived usefulness.	According to the authors' suggestion, further research should be extended to study the generality of the model in different countries.

Cont. table 3

Larsson and Larsson (2020)	20	Based on the semi-structured interviews with suppliers and clients, the authors examined the uncertainties which influence fostering, integrating, and maintaining strategy, especially in infrastructure projects due to the collaboration as part of sustainable project management.	The authors suggested conducting further research in three areas: the influence of collaboration duration time on organizational learning, the influence of collaboration intensity on organization mindset, and the relationship between collaboration and stakeholders' engagement.
Martínez-Perales et al. (2018)	19	The authors of the article showed that certification systems have a positive influence on a project's success in the energy sector. They presented the relationship between project success and project duration, project budget, year of funding, and management system of certifications.	The researchers recommend to analyze the projects by other sectors to study the certifications management system influence on project success.
Silvius and Schipper (2020)	16	The study showed the dimensions which influence project managers to implement sustainability into their projects: pragmatic, task-driven, and intrinsically motivated.	The recommendation for further research indicates taking into account the project managers' characteristics for different projects, industry, project type, and another controlling variable that allows studying the stimulus patterns for sustainability adoption.
Chofreh et al. (2019)	15	The article presents the answer to the question of why the concept of sustainable project management is important. Furthermore, the authors showed the research themes in sustainability, project management, and sustainable project management that the researchers should explore.	The authors recommended focusing further research on the following topics: "evolution, terminology, research direction, architecture, components, system design, software application, modelling, data management, simulation, customization, ethics, project team, organizational capabilities, organizational readiness, training, human resource management, cost management, integration management, standardization, maintenance, corporate performance, system's performance, evaluation, change management, process management, system extension, history, and research trends" to develop sustainable project management concept.
Marnewick et al. (2019)	15	The study showed that being intrinsically motivated is the most important pattern of project managers and what is the correlation between the pragmatic, intrinsically motivated, and task-driven patterns in project management.	It is recommended to repeat the survey on a larger group of respondents and to study the impact of industry on patterns of sustainability stimuli of project managers.
Xiaolong et al. (2021)	14	The authors examined exploring and validating the effects (economy boost up, environmental protection, international relations, project management, and success) of megaprojects affecting sustainable project management.	In future studies, more factors should be used to measure the success of mega-projects. Furthermore, project management should be used as a mediator.

Cont. table 3

Toljaga-Nikolić et al. (2020)	13	The article determines knowledge and skills important for sustainable project management. The results show that the application of project management methodology helps in the implementation of sustainable development, especially the social aspect, regardless of the industry.	The future study should include various competences and their importance for the concept of sustainable project management.
Rosłon et al. (2020)	10	The authors proposed the model enabling the combination of construction issues and project economic optimization and sustainability.	The authors mentioned using the model in the combination of project management and construction management system.

Source: own elaboration.

The table above shows that the most cited scientific articles included in the analysis focus on key factors and dimensions of sustainability in project management and project management activities, for instance, planning and decision making. Furthermore, the behavior and competences of project managers were analyzed by researchers in the light of sustainability. Some articles are devoted to conceptual issues, e.g., the essence of sustainable project management. In addition, scientists attempted to create models for measuring and analyzing sustainability indicators in project management.

The articles subjected to in-depth analysis were based, among others, on a literature review, empirical research, and case studies. The case studies most often concerned the energy and construction sectors.

Recommendations regarding the directions of further research on sustainable project management can be divided into:

- Organisational:
  - conducting research enabling the comparison of the examined characteristics concerning the sector of the economy,
  - extending the research to include various organizations and types of projects,
  - comparing the sustainable project management in different countries.
- Problematic:
  - study of control mechanisms in sustainable project management,
  - study of success factors and their measurement in projects managed in accordance with sustainability and the impact of sustainability on success,
  - examination of phases of project management in terms of sustainability,
  - study of factors influencing sustainable project management and ecodesign,
  - study of the process of implementing sustainability in project management,
  - research in the field of collaboration and stakeholders management,
  - research on the impact of the certification system on the development of sustainability in project management,
  - examination of the characteristics and competences of project managers in the field of sustainable development and project management.

- Methodological:
  - selecting a larger number of respondents and experts in empirical research,
  - application of the AHP method,
  - implementation of interpretative construction modeling techniques,
  - using project management as a mediating variable.

5. Summary

Sustainability in project management is gaining importance in the science and management and quality literature. Recently, there has been a significant increase in scientific publications on the subject of sustainable development impact on project management.

The article presented a literature review of 65 articles (2011-2021) that relate to sustainable project management or sustainability in project management. Based on the synthesis of the author's keywords and in-depth literature review of 22 the most cited articles from the sample the research questions were answered.

As far as the first research question is concerned, the most dominated topics of sustainable project management in the scientific literature were identified. Keywords analysis showed that in recent years, scientists have dealt with the topic of sustainable project management taking into account many aspects, e.g., environment, corporate social responsibility, or triple bottom line. However, the most dominant items in the literature were: project success, risk management, project management phases, and processes. For instance, the studies described in the articles were related to factors of project success and their assessment due to sustainability. Additionally, risk management through the prism of sustainability in project management turned out to be an important area of research (including risk identification, risk factors, risk responses). The essence of research on sustainability in project management phases and processes has been clearly noticed. Scientists pointed to the need for the study of sustainable project planning and decision making.

The in-depth article review provided the recommendations for further research directions. After the analysis of main research findings and further research directions, the author defined three categories of research recommendations to explore the sustainable project management concept. As organizational recommendations, the authors suggested extending empirical studies for different countries, sectors, and companies to develop a general concept of sustainability in project management. When it comes to the subject scope of further research directions it was recommended to study how sustainability influences project success, project phases, project collaboration. Furthermore, among further research directions were studies on project management abilities important for sustainability, the correlation between sustainable project management and project management certifications.

All these things considered, analyzed in the article subject of research still requires exploration and research by scientists to better understand the concept of sustainability in project management. The results of the conducted literature research suggest that sustainability has an impact on project management in many dimensions.

In conclusion, the article shows that further research is needed to develop the concept of sustainable project management. As far as the author of the article is concerned, many articles based on a literature review have already been written that describe the concept in general, e.g. definition, rules, dimensions. The author of the article concludes that future research should be a continuation of the research carried out so far, but the source of information should be empirical research based on actually implemented projects under the conditions of sustainability.

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Appendix – articles on sustainable project management

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