



An overview on Sustainability in project management

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Abstract

Despite growing recognition of the importance of sustainability in project management, its precise meaning and effective integration remain complex. This article focuses on this critical topic, aiming to analyze and organize existing knowledge in the literature and identify potential pathways forward. The article employs a literature review; the review categorizes key findings into thematic sections. It investigates the expansion of the Triple Bottom Line (TBL) framework within project management contexts, exploring additional dimensions beyond economic, environmental, and social considerations. Furthermore, it examines the evolving role of sustainability in project success, highlighting both its direct contributions and indirect benefits. The article then delves into specific sustainable project processes, including their benefits and challenges. Finally, it mentions critical success factors and indicators for successfully implementing sustainability within project management frameworks. Ultimately, this analysis emphasizes the need for a nuanced understanding of sustainability's multifaceted nature in project management.

Keywords: Sustainability, Project management, Sustainable indicators, Critical sustainable factors, sustainability practices



Introduction

The pursuit of economic growth without compromising social well-being has been a persistent dilemma in politics and management for more than a century and a half [1]. In today's complex and interconnected world, the success of any organization hinges not only on its tangible delivery of its projects but also on its lasting impact on the environment and society. This necessitates a paradigm shift where project management and sustainability cease to be siloed concepts but rather, become inextricably linked. The 2008 IPMA World Congress's opening keynote, demanding "accountability for sustainability" from project managers, marked a pivotal moment despite the embryonic state of sustainability considerations within the profession [2]. As the push for sustainable practices in every field intensifies, so too does the need to research and introduce effective ways to achieve this [3]. Though in recent years there have been numerous contributions to the field of the different aspects of interplay between sustainability and project management.

Project management

Projects are temporary endeavors aimed at bringing about positive transformations, such as the delivery of products or services. Project management is the process by which such changes are successfully accomplished [4]. Projects account for over 20% of global economic activity and surpass 30% of economic activity in certain emerging economies [5], thus they are perfect tools to enlist change within industries, organizations or businesses, or implement certain standards. Project management, emerging from a decentralized management approach, incorporates stochastic flexibility into the planning and programming of new ventures. As projects serve as instruments for implementing corporate strategies, it is imperative to integrate and evaluate sustainable development at the operational level [6].

Sustainability

Sustainability is a crucial issue that the United Nations has highlighted as one of the most pressing challenges of our time [7]. The concept of sustainability originated from sustainable development, which is defined by the World Commission on Environment and Development as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs" [8].

Sustainability encompasses three key dimensions (triple bottom line or TBL): environmental, economic, and social. The environmental dimension focuses on the preservation of the natural environment and the responsible use of natural resources, including air, land, water, raw materials, and minerals. It addresses issues such as energy efficiency, climate change, waste reduction, environmental accidents, pollution, and the protection of ecosystems. The economic dimension emphasizes maintaining financial stability and generating economic value. It encompasses aspects such as maximizing profit, generating wealth, reducing costs, and achieving capital growth and liquidity. The social dimension centers on building strong social relationships and promoting social well-being. It involves addressing issues such as balancing conflicting interests, fostering mutual trust and communication, promoting diversity, ensuring equal opportunities, establishing responsible governance structures, upholding democratic processes, and enhancing the quality of life [9], [10], [11].

By embracing sustainability principles, organizations can reap a multitude of benefits in terms of value creation, enhanced performance, increased efficiency, enhanced flexibility, and more [12]. In the modern era, it is impossible to think of economic development without the parallel construct of protecting the environment and the mutual benefits to society [13]. Adopting sustainability principles within an organization fosters long-term value creation by promoting organizational cohesion, enhanced efficiency, and increased flexibility. It also elevates the organization's reputation and image [12].

Project management and sustainability interplay

It is predicted that sustainability would be one of the key areas of project management development until the year 2025 [14]. Sustainability principles have become increasingly important for businesses, as they contribute to achieving long-term success and addressing societal challenges. One of the most significant ways to incorporate sustainability into business practices is through the development of new projects driven by sustainability principles [15]. Project management can be used to effectively incorporate sustainability principles into project planning and execution [16]. Økland [17] emphasizes the substantial potential impact of incorporating sustainability into project management, which he refers to as project sustainability management (PSM). He argues that since projects account for a significant portion of the global economy, the adoption of PSM can lead to transformative changes that promote sustainability.



The connection between sustainability and project management is firmly grounded in the shared goal of achieving positive change. Sustainability is essentially about generating beneficial change that aligns with the needs of both current and future generations [8]. Several frameworks, such as the sustainability reporting guidelines by the Global Reporting Initiative and the Indicators of Sustainable Development by the United Nations Commission on Sustainable Development, provide valuable guidance for implementing sustainable business practices. These frameworks offer a set of sustainable development indicators that can serve as tools for measuring and improving sustainability performance. However; several authors have noted that the integration of sustainability principles into temporary ventures, such as projects, is often overlooked [18]. *Eid* [19] further highlights that the primary project management (PM) frameworks lack sufficient alignment with sustainable development goals.

The current research aims to facilitate a better understanding of the role of sustainability in project management by highlighting the practices, Principles, indicators and critical success factors of sustainability exercised within project management.

Literature review

Over the years there have been many studies conducted in the fields of both sustainability and project management. In this section some of the more recent sustainability focused researches conducted on the topic project management, or any of the project management's bodies of knowledge. Reading and analyzing past studies give insight and a better grasp on the current topic.

Luiz and Carvalho's research dives into the under-addressed area of sustainability integration in project management. Through multiple case studies of companies from diverse sectors in Brazil and the USA, the study explores how businesses are implementing sustainability practices and analyzes their impact on project success. The findings reveal a general interest in sustainability among participants, with a disconnect between its perceived importance and its actual application in projects. Interestingly, companies in the public sector demonstrate a stronger focus on the social aspects of sustainability compared to their private counterparts. Overall, the study highlights the gap between awareness and action in integrating sustainability into project management, emphasizing the need for more effective implementation strategies [20].

Silvius and Shipper wrote a paper that tackles the increasingly crucial challenge of integrating sustainability into project management. Recognizing the growing awareness and need for change, it proposes a practical framework to bridge the gap between the abstract concept of sustainability and its concrete application within projects. The key contribution of this paper is the development of a sustainability maturity model. This model serves as a roadmap for organizations, helping them assess their current level of consideration for sustainability within projects. By evaluating projects against established criteria based on sustainability principles, the model provides a clear picture of their strengths and weaknesses [21].

Nikolic et al. revealed that applying established project management methodologies, regardless of the sector, promotes the inclusion of sustainability dimensions, particularly the social aspect. This connection arises from the inherent compatibility between the processes employed in such methodologies and the social elements of sustainability. However, the public sector presents a challenge, with project managers often lacking sufficient understanding of sustainability concepts and requiring targeted knowledge and skills development in this area. Overall, the findings suggest that established project management methodologies provide a foundation for embedding sustainability, highlighting the need for further education and training in the public sector to fully unlock this potential and ensure robust sustainable project management practices [22].

Obradovic et al. delves into the emerging landscape of sustainability in project management, exploring its intersection with modern methodologies, practices, knowledge, skills, and future trends. It highlights the pressing need to achieve sustainable development, not only at the societal level but also within the business sphere. As project management faces the challenge of creating value amidst dynamic environments, agility emerges as a key strategy. The paper examines the synergy between sustainability and agility, asserting their complementary nature in enabling project managers to navigate environmental burdens effectively [23].

Madureira et al. wrote a paper proposing a novel approach to Sustainable Project Management (SPM), emphasizing the crucial role of project managers in driving sustainability initiatives. It presents a set of practical recommendations and an original conceptual framework, the Project Management Triple Sustainability Cube, to guide project managers in incorporating sustainability principles into their work. The paper's recommendations and the Project Management Triple Sustainability Cube offer a practical framework for project managers to embrace sustainability and contribute to a more environmentally responsible and socially equitable approach to project management. This approach aligns with the growing demand for sustainable practices in the project management domain and empowers project managers to become catalysts for positive change [24].

Banaduc et al. conducted a study on a comprehensive exploration of the intersection between project management and sustainability, specifically within the context of urban development projects. Through a systematic literature review, the study delves into the approaches employed to ensure the successful implementation of sustainable objectives in urban projects. The authors strive to identify synergies between the strengths of project management and sustainability tools, advocating for a "win-win" scenario that enhances the effectiveness of sustainability integration in projects. The paper's objective is to unravel the connection between project management and sustainability, highlighting the transformative potential of aligning these domains towards a greener and more inclusive future. The study identifies unique and challenging experiences that illustrate the practical application of sustainable project management principles in urban development settings, demonstrating the potential to shape a more sustainable and equitable urban landscape [25].

Khalifeh et al. researched the potential impact of incorporating sustainability principles into project management practices, aiming to determine whether this approach can contribute to project success. A systematic literature review was conducted to analyze relevant empirical studies published before 2018. The authors identified a limited number of studies that directly examined the relationship between sustainability and project success. While the evidence suggests that sustainability practices may positively influence project outcomes, further research is needed to establish a stronger causal link [13].

Okland argued that a significant gap persists between theoretical recommendations and practical implementation. his paper delves into the literature on sustainability in project management, examining its influence on PM standards, stakeholder analysis, governance frameworks, performance indicators, and measuring schemes. While several authors propose paradigm shifts in project management to fully embrace sustainability principles, there appears to be a disconnect between these recommendations and actual project practices. To bridge this gap, the paper calls for further research into mental models of projects and sustainability [17].

Shirzad and Sorori's study investigates the impact of scope management on sustainable development in the construction industry. It found that effective scope management can help to reduce the environmental impact of construction projects and improve the quality of life for the people who live and work in the communities where construction projects are taking place. The findings suggest that scope management is a valuable tool for promoting sustainable development in the construction industry [26].

Research method

The research method deployed here is a literature review, by gathering and studying sufficient articles and records related to the matter the authors seek to saturate the research requirement. Records from reputable sources will be gathered and after a synthesis process their valuable relevant information will be systematically presented in this article. Records and relevant articles containing information on sustainability and project management were gathered and analyzed, the topics of these researches varied, but most asserted the same Principles. By gathering and aggregating the collected records the authors proceeded to reach the goals of the research.

Findings

This section, based on the gathered information from previous studies, presents information and the main findings of the research records. These include topics regarding the TBLs; adding new dimensions or broadening the current dimensions to the context of project management, the role of sustainability in project management, sustainable processes and naming key critical success factors and indicators of sustainable projects.

Expanding sustainability within project management

Although traditionally, as mentioned sustainability relies on 3 main concepts, the triple pillar of economic sustainability, social sustainability and environmental sustainability. A study based on the previously referred works was possible to collect and cross the main ideas reported in several published works, grouping the ideas taken from those works into the convenient directions, which expanded the three pillars or sustainability into relative project management aspects [27]:

- **ECONOMIC PILLAR**

- a) **Stakeholders' management:** Corporate sustainability is related to how companies drive their business especially nowadays that stakeholders expect to see results from their investments at least once a quarter.
- b) **Political and public management:** The business environment for stimulating entrepreneurial action can be understood in different ways, including the institutions, public and political organizations installed.
- c) **Engagement and innovation:** This aspect encompasses the indicators of leadership, commitment, productivity, and innovation.

- d) **Economic performance:** This aspect is directly influenced in a positive way by the project concept, if constant value delivery is effectively delivered.
- e) **Company–customer relationship management:** Managing relationships between customers and companies is a key part of any business, as customers are the biggest influencers on the company's growth.
- f) **Value chain:** A value chain is a business model that outlines the entire process of creating a product or service
- g) **Quality management:** The act of managing all activities and duties required to achieve a specified degree of perfection is known as quality management.
- h) **Productivity:** The amount of output divided by the volume of inputs is frequently referred to as productivity.

• SOCIAL PILLAR

- a) **Decision making:** The decision-making aspect is related to the influence that individuals have to change or impact on the system.
- b) **Learning:** The capacity to learn and finding new solutions are essential aspects of the empirical process characterizing project management, and individuals' ability to learn new skills is critical to the system's long-term viability.
- c) **Meaning making:** When companies work based on agile project management mindset, the organizations culture is influenced, contributing to empowering creation for individuals operating within the organization.
- d) **Self-organization:** The best architectures, requirements and designs emerge from self-organizing teams
- e) **Trust:** In project management practices, trust is a central point to promote employees' motivation, to support employees' self-organization capacities.
- f) **Collaboration/communication:** most present Communication/Collaboration as a central element of the APM methodology because, in agile teams, individuals, instead of working alone in their own spaces.
- g) **Motivation:** a well-defined formal approach that can encourage individuals to work more systematically.
- h) **Stress reduction:** it is expected to only generate the most essential documentation, and this has a positive impact by lowering the stress levels of the team members.
- i) **Commitment/ownership:** It is thought that the concepts of commitment, engagement, and interest could be easily linked, and that the sense of ownership was also employed in a similar way.

• ENVIRONMENTAL PILLAR

- a) **Environmental resource:** Environmental resources are the resources available in nature to obtain goods, services, or as human support.
- b) **Legislation:** In terms of legislation, the ISO 14004 standard helps the company to recognize the legal requirements (laws, decrees, supplementary laws, agreements with environmental inspection bodies, in addition to international standards) applicable to environmental aspects.
- c) **Environmental involvement:** Sustainable development has emerged as an influencing, albeit controversial, aspect for the design of business and policies.
- d) **Certifications and environmental education:** An open-minded team is more likely to learn new things.
- e) **Sustainable consumption of environmental resources:** The effective management of natural resources for the benefit of the entire human community is what sustainable environmental resource usage entails.
- f) **Environmental policy and management system:** An environmental policy is a written declaration usually signed by the top management, which explains a company's goals and principles for controlling the effects and aspects of its operations on the environment.
- g) **Commitment, scope and dissemination of environmental policies and criteria:** Protecting the earth's local and global environment, including pollution prevention, responsible use of natural resources, and proper waste management.



Role of sustainability in project management

There are different interpretations of the role of sustainability in project management; in the conducted studies and researches there were different and sometimes even opposing interpretations of what the role of sustainability is within the project management context and what it means. A study conducted by Friedrich researched the roles and pointed out that there are 3 main roles of sustainability in project management which are depicted in figure 1 [28].

1

Sustainability as a constraint

- In this context, sustainability is viewed with suspicion, perceived as a potential roadblock to project completion and a source of additional risks. This outsider perspective casts sustainability as a necessary evil, driven by external pressures rather than intrinsic value.

2

Sustainability as instrumental value

- This alternative view casts sustainability not as a burden to bear, but as a powerful lever for achieving the project's core objective.

3

Sustainability as intrinsic value

- This interpretation elevates sustainability to a core objective, transcending conventional project management by integrating economic, environmental, and social goals as paramount priorities. All sustainability dimensions are given equal weight, forming the very foundation of the project rather than mere prerequisites or ancillary concerns.

Figure (1) different roles of sustainability [28]

Sustainability project processes

Most accepted project management standards as PMBok of PMI [4] or ISO 21500 are based on processes. The processes approach has been the most used by some studies to introduce sustainability in project management. Studies such as [29] show that the processes more frequently mentioned are: Stakeholder management, Life cycle management, Assessment and Decision-making.

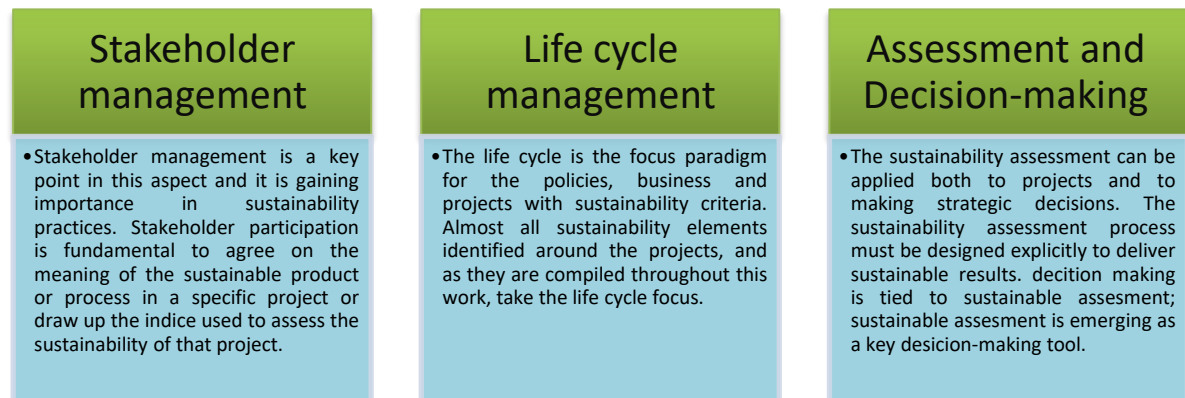


Figure (2) Sustainable project processes [29]

There are also some challenges involved towards the application of sustainable principles in project management such as Planning-related challenges, Project-related challenges, Client-related challenges, Project team-related challenges, Labor -related challenges and other external challenges [30].

Sustainable indicators and critical success factors

An important matter to consider are indicators and critical success factors (CSF); there is a need to implement an indicator set that allows sustainable targets to be met in projects, as well as to control and monitor the progress of these indicators over time. Critical success factors (CSFs) represent the minimum essential conditions that must be fulfilled for a project to achieve its desired outcomes and mitigate significant risks. There have been a number of studies in both indicator and CSF for sustainable projects; *Banihashemi et al.* [31] sum up the sustainable CSFs into multiple stages namely; identification, evaluation, Commitment, Preparation in organization, Preparation on project and implementation, while *Martens & Carvalho* [32] name 4 main CSFs types (Environmental policies and resources saving, Economics and competitive advantage, Stakeholders management (society, employee, suppliers and contractors) and Sustainable innovation business model) and break them down into sub-factors. There are also studies on sustainable project indicators [33], [34], presenting indicators for each of the TBLs, for example a study on sustainable indicators for construction projects, following a literature review and survey introduced the respective indicators to each TBL; overall the principal considerations for sustainable constructions exist in the following sustainable PM indicators [34]:

- Up to date environmental construction technologies and methods
- Financial/Economic performance
- Cost management plan
- Environmental education and training
- Environmental/economics accounting
- Sustainable use of natural resources
- Eco-efficiency
- Energy efficiency
- Environmental impact assessment project report
- Efficient allocation of resources

Project sustainability Principles

As mentioned before sustainability is a top three pillars also knows as the triple bottom lines TBL, However, several studies consider more principles or ‘dimensions’ of sustainability that are relevant to project management. Studies such as [35], [36] mention multiple dimensions which are relevant to project management and also name their possible influence on some of the project management roles (manager, client, sponsor, senior, etc.).



Figure (3) Set of sustainable project principles [35]



Figure (4) Set of sustainable project principles [36]

Conclusion

The following article presents an overview of sustainability in project management. The article aimed at grasping a better comprehension of the meaning of sustainability in project management. By collecting reading a substantial amount of literature the authors conducted a literature review in hopes of gathering data on the topic. The findings were divided based on the topic in different sections namely; expansion of the TBLs contextualized for project management, sustainable principles and other dimensions besides the TBLs, role of sustainability for project management, sustainable project processes and the challenges related to implementing them and the many critical success factors and indicators related to sustainable project management.

Some topics for future research include [37]:

- extending the research to include various organizations and types of projects
- examination of phases of project management in terms of sustainability
- comparing the sustainable project management in different countries
- study of success factors and their measurement in projects managed in accordance with sustainability and the impact of sustainability on success
- examination of the characteristics and competences of project managers in the field of sustainable development and project management



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