Claus Hüsselmann, Peter Kühn

Ecological sustainability in Project Management

A systematic literature review

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Herausgeberbeirat: Prof. Dr. rer. oec. Claus Hüsselmann
Prof. Dr.-Ing. Wolfang Schulz-Nigmann

THM Technische Hochschule Mittelhessen
Fachbereich 14 Wirtschaftsingenieurwesen

Wilhelm-Leuschner-Straße 13

61169 Friedberg

https://www.thm.de/wi/

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Autoren: Claus Hüsselmann, Peter Kühn

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Kurzfassung [dt.]: In einer sich immer schneller verändernden Welt sieht sich das Projektmanagement als Instrument des Wandels zunehmend mit den Bedürfnissen und Forderungen der Stakeholder nach ökonomisch, sozial und ökologisch nachhaltigen Ansätzen konfrontiert. Das Projektmanagement muss dies berücksichtigen und dazu ist es notwendig, Nachhaltigkeit in die Projektmanagementprozesse zu integrieren. In diesem Beitrag wird untersucht, inwieweit sich das Thema Nachhaltigkeit im Projektkontext bereits in Wissenschaft und Praxis etabliert hat. Ein besonderer Schwerpunkt wurde auf die ökologische Dimension der Nachhaltigkeit gelegt. Zu diesem Zweck wurde eine systematische Literaturrecherche durchgeführt, bei der 114 Quellen aus den Jahren 2009 bis 2023 untersucht wurden. Es wurde festgestellt, dass die ökologische Dimension der Nachhaltigkeit in der wissenschaftlichen Diskussion und in den Standards des Projektmanagements wenig Beachtung findet, obwohl die Zahl der Veröffentlichungen zu diesem Thema zunimmt.

Abstract [en]: In an ever faster changing world, project management as an instrument of change is increasingly confronted with the needs and demands of stakeholders for economically, socially and environmentally sustainable approaches. Project management must take this into account, and to do so it is necessary to integrate sustainability into project management processes. This paper examines the extent to which the topic of sustainability in the project context has already established itself in science and practice. A particular focus was placed on the ecological dimension of sustainability. To this end, a systematic literature review was carried out, looking at 114 sources from 2009 to 2023. It was found that the ecological dimension of sustainability receives little attention in the scientific discussion and in project management standards, although the number of publications on this topic is increasing.

Schlagwörter (dt.): Produktlebenszyklus, Projektlebenszyklus, Projektmanagementstandard, Nachhaltigkeit im Projektmanagement, nachhaltige Projektmanagementprozesse

Key Words (en.): Product life cycle, project life cycle, project management standard, sustainability in project management, sustainable project management processes

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Introduction

The topic of sustainability has been a constant companion in a wide variety of media for many years, and the topic has also arrived in the field of project management (PM). As early as 1987, the United Nations (UN) recognized sustainability as one of the most important tasks of the future in its *Report of the World Commission on Environment and Development* (1987). As the effects of anthropogenic climate change have become ever more apparent in recent years, the topic of sustainability is becoming increasingly important in all areas.

Especially since the beginning of the 21st century, the academic discussion regarding sustainability in projects has steadily increased and scientific interest has grown, especially among project researchers (Aarseth et al., 2017). As an instrument of change, this topic must also be considered in PM (Daneshpour, 2015). However, strategically implementing sustainability goals in projects through concrete, suitable measures is a complicated process. The former President of the International Project Management Association (IPMA) Wagner says in this context: “In my view, the discussion about sustainability is taking place in the Sunday parlors, such as the United Nations or politics. There are big elephant rounds with commitments, but nobody cares how it is actually implemented in practice” (Biermann et al., 2018).

“In the profession, we have seen an increased level of awareness of what sustainability related impacts are and their relevance to projects and project management,” explains founder and Managing Director Carboni of GPM Global (GPM Global, 2022).

Sustainability is often only associated with the areas of environmental protection and nature conservation (Fierke, 2021). However, sustainability encompasses more aspects and is now divided into three areas: economic, environmental and social sustainability (Corsten & Roth, 2012; Fierke, 2021). The UN (2015) adopted the *17 Sustainable Development Goals* (SDGs), including the 169 sub-goals, in its report *Transforming our world: the 2030 Agenda for Sustainable Development*.

For companies, sustainability is no longer just an advertising slogan, but a competitive factor in today's world. In the European Union (EU) in particular, more and more companies are required by law to produce sustainability reports, as the *Corporate Sustainability Reporting Directive* will oblige more European companies to produce sustainability reports in future (UBA, 2023). According to current estimates, there will be 49,000 companies across the EU instead of the current 11,600 (BMAS, n.D.).

Projects and the associated PM practices are used by companies and organizations to implement their business strategies. It therefore makes sense to integrate sustainability aspects into PM (Mochal & Krasnoff, 2013).

Objective, relevance, and delimitation of the study

In 2011, Martinuzzi et al. found that sustainability had not yet been embedded in PM standards and wrote: “An examination of the aspects of PM – and not the content of projects – from the perspective of sustainable development has not yet taken place” (2011). Six years later, Silvius (2017) said as result of an expert survey that the major PM standards are changing and incorporating the topic of sustainability into their standards (Wolfgang, 2017).

But how has PM developed up to the year 2023 and is sustainability in processes, methods and competencies actually taken into account in PM today? Taking the *International Organization for Standardization* (ISO) as an example, Heydenreich (2023a) wrote: “However, project management in connection with sustainability has hardly been mentioned in ISO standards to date”.

Therefore, this article addresses the following **research question:**

To what extent are environmental sustainability principles already anchored in project management practices?

> **Sub-question 1:** *What ecological benefits can sustainability in project management bring to the implementation of projects?*
>
> **Sub-question 2:** *How can sustainability be institutionalized in the processes, methods, and practices of project management?*

The aim was to determine how the ecologically sustainable design of processes during a project is dealt with in today's PM and scientific discussion, and what effects sustainable practices can have on the project outcome.

This article describes the current state of sustainability in PM and aims to contribute to the groundwork for further research in the field of sustainability in PM. The focus of the article is primarily on the ecological aspects of sustainability.

Procedure and methodology

The answer to the research question is to search for and analyze sources (books, specialist articles, conference papers, blog entries, studies, university texts etc.) from the field of PM with a focus on sustainability. The first step was an extensive systematic literature review (SLR), using Google Scholar as this is particularly suitable for searching for relatively new articles and subject areas (Bauer & Bakikalbasi, 2005), and other scientific search platforms, such as ResearchGate and ScienceDirect. It was based on keywords *sustainable OR sustainability* and *project* OR *project management.*

The sources found at the beginning of the research were evaluated, and the snowball system, which refers to sources used by the authors in the reviewed texts, was used to search the documents for further sources that met the search criteria (Pieruschka, n.D.).

Once the research was complete, the collected literature was analyzed and, if necessary, sorted or classified before the relevant sources were evaluated.

The identified sources were divided into three classes by reviewing their abstracts and conclusion:

Class 1: **The project is geared towards sustainability**, i.e., the topic of sustainability in PM in general.

Class 2: **The aim of the project is sustainability**, i.e., projects that aim to provide a sustainable benefit for the organization.

Class 3: **Project processes and management are designed according to sustainable aspects**, the topic of how and in what way it is possible to integrate sustainability into PM processes.

Other sources were excluded and not processed further. The sources that could be assigned to class 3 were examined more closely to determine the extent to which the topic of environmental sustainability principles is mentioned in project processes or management.

Presentation of the search process

A total of 114 sources within a period from 2009 to 2023 resulted from the combination of SLR and snowball system – see Figure 1.

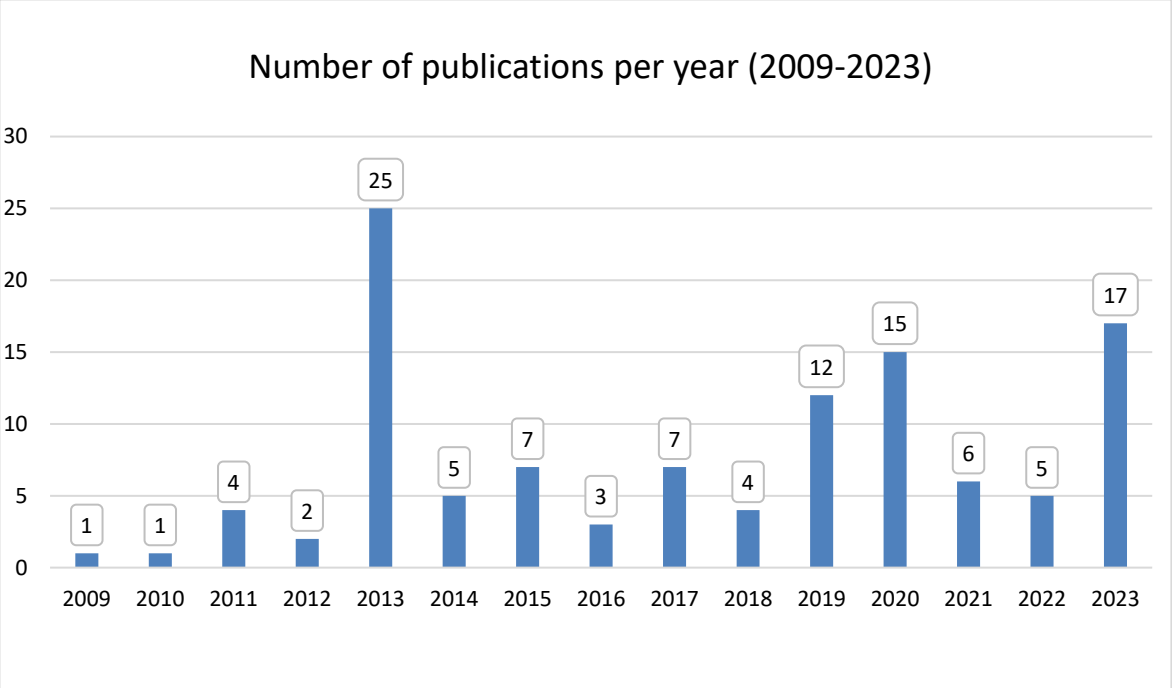

Figure 1: Publications per year (2009-2023)

Figure 1 shows an increase in publications over time. The high number of publications in the period 2013 is due to the thematic anthology by Silvius and Tharp (2013), from which 24 of the 25 identified sources originate. For the year 2023, eleven of the 17 sources found were from the journal *Projektmanagement Aktuell* and its focus issue on sustainability (GPM, 2023).

Result of the classification

The 114 sources were divided into the previously described classes 1–3 or excluded if there were no matches with the class descriptions. It should be noted that the sources found and subsequently evaluated do not claim to be exhaustive in terms of all published articles, books, studies, etc. on the keywords searched for – especially since only open access sources or sources available to the authors were used.

The majority of the 114 identified sources originate from scientific journals (62, i.e., 54%). The second largest group of sources is thematic anthologies (24, i.e., 21%), followed by conference papers (16, i.e., 14%). Seven texts (6%) come from open access publications, two from university publications (2%), two from essentials (2%), and one document (1%) from studies.

A total of 35 journals with 62 articles on sustainability in the context of PM were researched. These were not only published in renowned journals with PM as an explicit focus, but also in other specialist areas. An observation that Aarseth et al. (2017) also emphasize. Examples are the *Journal of Cleaner Production,* and the journal *Sustainability*, the latter having published eleven articles examined in more detail (Rahman, 2022).

Of the 114 documents assessed, 52 texts (46%) were assigned to *class 1*. Five documents (4 %) were assigned to *class 2*. Of the sources reviewed, 39 (34%) fell into *class 3*, which is the most important class for further processing. 18 texts (16 %) were excluded from further processing.

Further Differentiation

To address environmental sustainability in PM, class 3 was subdivided into subclasses: (1) Economy, (2) Social affairs, (3) Ecology, and (4) No focus. Analysis showed that 5% of sources focused on economic sustainability, 10% on social, 8% on ecological, and 77% had no clear focus, addressing multiple sustainability pillars.

Based on this result, texts in subclass (4) were not excluded, but were further analyzed for environmental sustainability components. A word frequency analysis of subclass (3) identified key terms that were then used to analyze subclass (4), confirming their relevance to environmental sustainability. These sources were therefore included in the ongoing research.

Comparison

Science

The increasing importance of sustainable developments in the economy is also reflected in the growing number of publications on sustainability in PM in recent years (Zakrzewska, 2022). However, the topic is still young and only began to gain importance around 2003 (Stanitsas et al., 2021). This is also reflected in the number of publications on this topic. While there were isolated publications in the 1990s, the number increased steadily at the beginning of the 21st century (Silvius & Schipper, 2014). Mochal and Krasnoff (2013) emphasize: “Ideas and research for green thinking in project management continue to emerge, although the widespread practical application of careful consideration of the environmental dimension in structured PM processes remains, as far as we know, a hope for the future”.

Interest in studies on the topic of sustainability in connection with PM is growing steadily (Sroufe, 2017; Sneddon et al., 2006). The majority of studies that deal with the inclusion of sustainability in PM are in the fields of construction, infrastructure, and engineering. Most of the studies are interpretative in nature and attempt to explain how sustainability should be understood in the context of projects. Only a small proportion of the studies are normative in nature and attempt to describe how sustainability can be integrated into projects (Toledo et al., 2023). In this respect, they provide a basis for integrating sustainability into PM, but do not provide a clearly formulated way in which this can be done (Silvius & Schipper, 2010; Schipper & Silvius, 2017; Yu et al., 2018). Silvius and Schipper (2014) also report that in their SLR, which looked at 164 sources in the period from 1993 to 2013, a large proportion of the conceptual publications were explanatory in nature.

Zakrzewska's SLR in 2022 revealed 65 articles dealing with the topic of sustainability in PM or sustainable PM up to 2021. This showed that the number of publications has risen steadily since 2017. In 2020, 10 articles were found; in 2021, this figure more than doubled to 25 articles (2022).

The fact that this is still a new area of scientific research can also be seen from the fact that no uniform definition of sustainability, i.e., one that is accepted by the majority of researchers, has yet been developed (Fierke, 2021). Silvius and Schipper (2014) found that only a few of the publications examined dealt with a definition of sustainability in PM.

Despite the increasing number of publications on the topic of sustainability in PM, only a few deal with the direct integration of sustainability into PM (Toledo et al., 2023). This was also confirmed by the source search carried out as part of this study. The sources found were predominantly of a descriptive nature.

One of the few sources identified that deal with integration into PM is De la Cruz López et al. (2021), who have developed seven new processes to enable the integration of sustainability into PM. This

introduces a new task into PM, project sustainability management (PSM). It is proposed that the existing PM processes be expanded to include the PSM processes in order to incorporate sustainable aspects into PM.

Another area of scientific debate on the topic of sustainability in PM deals with the question of the project vs. product life cycle. Traditionally, the delivery of the project result in the form of the end product or service to the client represents the end of the project. However, the benefits of the project investment beyond the period of project activity are increasingly being taken into account in PM processes (Hüsselmann, 2023; Gareis, 2005). This represents a paradigm shift in relation to the project life cycle and is directly linked to the concept of sustainability (Rahman, 2022).

Armenia et al. (2019) and Zakrzewska (2022) stated in their published SLR that life cycle orientation is one of the leading topics in the context of PM and sustainability. Rahman also addresses the topic of life cycle orientation in relation to sustainable PM (2022).

Nowadays, organizations manage the creation of corporate value through projects, as one-off, time- and financially limited activities. The results of a project, be it products or services, can have social, economic or environmental impacts that extend beyond the duration of the project (Toledo et al., 2023; Kerzner, 2017). PM as a field of research and organizational approach has evolved over time (Turner et al., 2013). In classic PM, there is a clearly defined start and end point of the project, which defines the life cycle of the project. This is at odds with the long-term approach of sustainable PM (SPM) and represents a conflict with sustainable development (Chawla et al., 2018). Successful integration of sustainability aspects into PM requires not only consideration of the project life cycle, but also a focus on the life cycle of the product or service as a result of the project (Labuschagne & Brent, 2005).

The project result is created in the closed structure of the project. So far, however, little attention has been paid to the extended life cycle of a project's outcome or in relation to the SDGs in terms of sustainable and methodical PM (Glitscher, 2023). Professional PM is itself undergoing a transformation in which professional boundaries and tasks are being expanded to include social and environmental aspects in project development (Sabini & Silvius, 2022; PMI, 2006; IPMA, 2015; Sabini et al., 2017). The challenge today is to maintain economic, social and environmental balance. Organizations and managers must face this challenge. SPM can be an answer to the challenge of constant change (Zakrzewska, 2022).

In order to reduce the conflict between the classic PM view of the project life cycle and the product life cycle viewed from a sustainability perspective, Biermann et al. (2018) propose the introduction of target area A and target area B. Target area A comprises targets that can be classified as fulfilled and not fulfilled at the end of the project. Target area B defines targets that do not have to be achieved in the project life cycle, but beyond that in the course of the product life cycle. This target space consideration should be subdivided into the three areas of sustainability and taken into account right from the start of the project. It is suggested that when determining the project's objectives for the ecological, social and economic dimensions of the project, short-term targets are set as the result of the project and long-term targets for the life cycle of the project result are defined and set out in the project assignment.

This extension of the PM methodology is in line with the previously described requirement to define sustainability goals at the start of the project. Creating the project assignment is a task that takes place as part of the initiation and preparation at the start of the project. This involves specifying the project objectives, delimiting the project content, defining success criteria for project

implementation, selecting a project solution approach, identifying the budget requirements and determining the client (Hüsselmann, 2020).

The target space approach shows that it can be easily integrated into the PM process. It is an adaptation of the already established methodologies to include the sustainability approach. The project manager is responsible for drawing up the project assignment. It gives them the opportunity to consciously involve project clients and stakeholders in the planning from the outset and to jointly define the objectives from a sustainability perspective (Crawford, 2013).

In the period from 1993 to 2013, 86% of the sources examined by Silvius and Schipper mentioned an ecological dimension in the context of sustainability and PM. Here, 86% of the publications also referred to Elkington's TBL concept (2014). The points outlined above reveal numerous differences between traditional PM and sustainable PM. Table 3 illustrates the seven most divergent factors.

Table 1: Differences in traditional PM vs. SPM

Traditional PM	**Sustainable PM**
Short-term focus	Long-term and short-term orientation
Oriented towards the interests of project sponsors and stakeholders	Oriented towards the interests of present and future generations
Result/supplier orientation	Life cycle oriented
Greater focus on scope, time and cost, known as the magic triangle of PM	Stronger focus on TBL, i.e., people, planet and profit, which harmonizes social, ecological and economic aspects
Emphasis on performance	Emphasis on the result
Perspective of a single project	Portfolio management perspective
Less complexity	Increasing complexity

Table 3 (see Silvius & van den Brink, 2011; Moehler et al., 2018) shows that in the case of an SPM in particular, the project should also be considered in the long term, taking into account the product life cycle, sustainability aspects and project results. Accordingly, Zakrzewska (2022) notes that the challenge today is to maintain an economic, social and ecological balance. Organizations and managers must face this challenge. SPM can be an answer to the challenge of constant change.

Standards, guidelines, and models

The terms and definitions in the context of PM are a building block for linking the fundamental philosophies of PM with the goals of sustainability and sustainable development. These terms and definitions are issued by the various PM associations and organizations (Rahman, 2022).

Sustainability in PM is becoming increasingly widespread in standards and guidelines. The P5 ontologies of the P5 framework of Green PM (GPM Global) can be regarded as the best known of these. With its five aspects: People, Planet, Prosperity, Process, and Products. The *Projects integrating Sustainable Methods* (PRiSM) methodology, for example, is based on this framework. The IPMA Project Excellence Baseline (PEB), which strives for a balance between people and goals, processes and resources as well as project results, can also be used to integrate sustainability principles into PM (Zakrzewska, 2022).

The ISO is also aware of the importance of sustainability, although its standards barely mention sustainability in connection with PM (Heydenreich, 2023b). The ISO Strategy 2030 describes the role of ISO in relation to sustainability as follows: “ISO is built around an ethos of collaboration and believes that standardization plays a key role in transforming our world into a sustainable one” (ISO, 2021).

Practice

Within the scope of the SLR conducted, no sources could be found that deal with the holistic implementation of sustainability in projects in practice. The sources state that various methods, tools, and techniques are used in PM. However, despite the large number of tools available to today's project managers, there is little substantiated evidence that these are suitable for integrating sustainability into PM methods (Rahman, 2022).

In addition to these points, the sources provide a critical analysis of the current status of the integration of sustainability principles into PM: “Project management is increasingly evolving from a tactical level 'tasks' to societally-relevant 'instruments of change' within organizations and hence, the theories, methods, and practices of project management need to evolve accordingly” (Marcelino-Sádaba et al., 2015; Silvius & Schipper, 2019). In the future, the understanding of the role of a project manager should go beyond the classic phases of the project, and they must take responsibility for incorporating sustainable aspects into PM (Daneshpour, 2015). Project managers need specific individual skills for this in order to implement sustainable goals in projects. It is pointed out that these skills have not yet been taken into account in the traditional training of project managers (Silvius & Schipper, 2014). Rahman (2022) also notes that there do not yet appear to be any studies that have comprehensively set out which skills a project manager needs to acquire in relation to sustainability in order to successfully contribute to sustainable development. Additionally, this study did not identify any specific individual competencies beyond the traditional competencies required for a project manager or project team to implement SPM successfully.

The analysis revealed that the sources increasingly point out that sustainability aspects are not sufficiently integrated into the standards. Instead, it is recommended that sustainable PM processes be integrated as an extension of traditional PM processes in order to make efficient use of the company's resources and optimize the achievement of objectives. The interests of all groups involved should be considered. The aim of sustainable PM processes should be to reduce costs, minimize risks and protect the environment in order to increase attractiveness for investors in the long term (Toledo et al., 2023). Companies should not see sustainability as a threat or a reason for higher costs, but as an opportunity and a possible business model. It is important to overcome the challenges that arise in practice (Heydenreich, 2023; Silvius, 2012).

Methods, tools, and techniques are aids that support the project manager and his project team in achieving project success (Besner & Hobbs, 2008).

In summary, a mixed picture emerges, which reveals initial approaches in standards and models for integration, but also shows that little has been done in the training of project managers. Although there is an increasing awareness of the issue of sustainability in PM in the PM community, it is not apparent that practical implementation is prepared for it. There are signs of a discrepancy between the perception of the importance of sustainability in PM and the actual benefits (Sankaran et al., 2018; Martens & Carvalho, 2017).

In order to implement sustainable decisions in projects, it is necessary that sustainability also has a high priority within the company, as it can only be implemented in projects if managers support the topic (Fierke, 2021). Making sustainable decisions can be difficult if there is no sustainable corporate culture (PMI, 2011). Furthermore, this means considering the long-term effects of a project, as well

as the involvement of a significantly larger number of stakeholders and thus a greater number of conflicts of interest (Heydenreich, 2023a).

There is increasing attention in academic research on the topic of sustainability-oriented performance indicators and evaluation, yet little is known about the practices that can be used to manage projects to ensure that sustainability goals are achieved in a project (Kivilä et al., 2017).

Discussion

Ecological sustainability in project management

This article addresses the question of the extent to which ecological sustainability has already found its way into today's PM. If you look at it from a scientific perspective, the topic of ecology as an independent area has so far received little attention.

In the growing discussion among researchers on the topic of sustainability in PM and SPM, there is often talk of a triad between the three pillars (ecological, economic, and social) of sustainability. Nevertheless, this implies that it is nearly impossible to prioritize the topic of ecology exclusively, as the interactions between the ecological, economic, and social realms must always be considered.

The authors do not wish to question the fact that the three pillars influence and reinforce each other, but if we stick to the definition of the TBLs (Planet, People, and Prosperity), it should be noted that the planet, i.e., our environment, must be given greater focus, as there can be no social and economic prosperity without an intact environment. This approach is also pursued, for example, by the priority model of sustainability. Based on the literature review presented above, it must be noted that the environment does not play an overriding role in the publications on sustainability in PM. As part of the SLR carried out and the subsequent analysis of the sources found, it also emerged that the statements described above are primarily of an interpretative nature, i.e., they only describe the topic of sustainability in the context of PM.

Although the topic has arrived in the relevant standards for PM, it is still in the early stages of extensive discussion and implementation. Although there are efforts to cover the topic, the IPMA PEB has dedicated a separate chapter to the topic or GPM-P5, which has developed an entire framework around the topic of sustainability and SDGs, it could not be determined in the context of this work that these are already frequently used in practice. The PM community and project managers are also aware of the topic, but according to the current state of research, they do not yet have suitable standards, methods, and tools to implement this.

Benefits of ecologically sustainable project management

PM, classically described by the three sides of the magic triangle of PM (cost, time, scope), is assumed to be in conflict with TBL approaches. Yet sustainability represents an economic advantage for companies, is taken into account in marketing strategies, is increasingly prescribed by laws and regulations and is increasingly demanded by stakeholders.

Sustainability is one of the most important issues of our time and will become increasingly important due to climate change. Projects can be a means of change in companies. Without them, it is hardly possible to face up to constant change in today's increasingly projectized society (Wagner, 2021). If projects are the means of implementing change in an organization, and sustainability is one of the most important issues of our time, it seems only logical to combine the two.

Companies are increasingly confronted with the demand for reporting, also in relation to sustainability. The preparation of sustainability reports has become mandatory for some large companies in the EU and for more and more of them, reporting on sustainability in their company is part of good

practice. Nowadays, it is even a competitive disadvantage if your competitors are reporting and you are not. There is also a link to PM here, as many of the measures that are the subject of reporting in the sustainability report are implemented through projects.

SPM should pursue a long-term approach geared towards the life cycle of project results, even if this contradicts the classic PM approach. “Therefore, further development of the profession of PM involves considering the professional responsibility of sustainability from a wide and full life cycle perspective within projects from resources to implementation to outcomes” (Daneshpour & Takala, 2017).

Clients assume responsibility for the project result after handover. It should therefore be in the interest of the project client that the long-term sustainable benefits of the project outcome are considered right from the start of the project. SPM can help to increase the success of the project, which in turn has a positive influence on sustainability reporting and can therefore represent a competitive advantage. It should therefore always be in the interest of an organization's management and stakeholders to integrate sustainability into PM as far as possible and to actively promote this.

Integration of ecological sustainable project management

The SLR revealed that the integration of sustainability aspects is still in its early stages. Although science, PM standards and practice have recognized that it is necessary to integrate sustainability into PM, hardly anything has happened in this direction to date. Only individual approaches to integration are recognizable. In order to establish sustainable PM, sustainable thinking, i.e., green thinking, is seen as a basic prerequisite.

Even if a project manager and their team have internalized the topic of sustainability, successful implementation in their projects is all the more likely if company management and the project client also set an example on the topic. If sustainability aspects are anchored in the corporate culture, are part of the corporate goals and are implemented by the management, it is likely that they will also be considered in PM.

In the scientific discussion, it is emphasized that the integration of sustainability aspects must be taken into account from the very beginning of the project. The project assignment is particularly emphasized here. In order to ensure the long-term sustainability of the project, it is essential to expand the project assignment to include aspects of sustainability. This will enable the definition of sustainable goals for the project at its inception and the entire life cycle of the project result is considered. In this way, it can be ensured at an early stage that the project client's requirements for the sustainability of the project are taken into account.

In this article, the authors have identified two basic approaches to integrating sustainability into PM. The dominant approach in the scientific discussion is the modification of PM methodologies. This assumes that for sustainable PM, the established standards, guidelines, methods, and tools must be adapted in such a way that the sustainable outcome of projects can be supported. One example of the application of this approach is the adaptation of a project's target definition. Here, the project's target space is expanded to include the product life cycle and divided into the three pillars of sustainability (Biermann et al., 2018). Here too, the concept of the two-part life cycle of the project result requires new skills from the project manager.

The second approach is more comprehensive and assumes that today's PM must be expanded to include aspects of sustainability. This is to be achieved by introducing new processes, tools, and methods. Examples of this approach include the seven processes of De la Cruz López et al. (2021) and the introduction of an SMP in PRiSM (Carboni et al., 2013).

There is a need to disseminate sustainable PM methods to establish them as a standard in PM. The integration and definition of sustainability as a PM knowledge area in PM standards must be prioritized and focused in order to increase the impact on the PM community and make the topic more relevant (Toledo et al., 2023).

Update 2025/01

This report was prepared in the first half of 2024. In the fourth quarter of 2024, Silvius and Huemann and the International Project Management Association (IPMA) published two important publications on the domain under review (Silvius & Huemann, 2024; IPMA, 2024), which therefore could not be the subject of the original review. However, as the contribution of these publications is to be regarded as significant, their contents are summarised here.

Extension of the IPMA competence guideline

The IPMA Individual Competence Baseline (version 4, ICB4) describes the competences required by people working in the field of project/programme/portfolio management. The extension of the IPMA Competence Guideline by the ICB Reference Guide for Sustainable Project Management (IPMA, 2024) systematically integrates sustainability aspects into the competences for project, programme and portfolio management. So-called key competence indicators provide the reference points for SMP in particular.

The "perspective" competences are mainly influenced by the aspects of sustainability and responsibility. These competences therefore contain significant changes and additions compared to the "practice" competences, which are partially influenced, resulting in a number of competences with significant additions and others that hardly change at all. The "People" competences are least influenced by the aspects of sustainability and responsibility.

In detail: The integration of sustainability aspects into projects requires systematic consideration of contextual competencies that include strategic, organizational and interpersonal perspectives. Strategically, projects must be aligned with the organization’s sustainability goals and strategies in order to assess social and environmental impacts and ensure long-term positive effects. Governance and compliance require adherence to regulatory and ethical standards and the implementation of structures that promote sustainability, such as ESG reporting standards (Environmental, Social, Governance). It is important to consciously manage the influence of stakeholders and incorporate cultural values into the project design in order to promote acceptance and commitment.

Personal and social skills include self-reflection, responsibility and ethical behavior. Leaders are expected to drive sustainable practices through strategic vision and leadership by example, while teams promote diversity, respect and innovation. Conflicts are managed through analytical and creative approaches, and the focus on results aims to maximize positive social and environmental effects.

Technical skills focus on sustainable project design that systematically analyses social, technical and environmental impacts. Sustainability criteria determine the selection of resources and procurement, while time and quality management are geared towards efficiency and social responsibility. Risk management integrates preventive strategies, and co-operation with interest groups improves project results. Transformation processes support long-term sustainable development.

Research handbook on sustainable project management

Silvius & Huemann (2024) provide a comprehensive basis for the further development of sustainable project management and offer both theoretical models and practical recommendations. The approaches and frameworks presented can serve as orientation aids for the implementation of sustainability in projects.

The following contributions can be identified:

Findler and Martinuzzi analyze how sustainable innovations can be promoted in projects. They identify specific methods and tools such as materiality assessments, scenario techniques and systemic canvas models. These approaches are based on systems theory and are intended to capture the complexity of sustainability issues in project management. The authors emphasize that the successful implementation of these approaches depends on their practical application. They should not only contribute to the achievement of objectives, but also to long-term value creation (Findler & Martinuzzi, 2024).

Unterhitzenberger analyses the requirements for a governance structure that enables sustainable project management. She describes sustainable project management as an integrative approach that takes into account the environmental, social and economic impacts over the entire project life cycle. Particular attention is paid to the diversity and independence of governance bodies. The establishment of CSR committees and the regular review of sustainability goals are seen as key steering mechanisms. Unterhitzenberger also argues in favor of closer integration of governance and project management structures in order to make the implementation of sustainability goals more efficient (Unterhitzenberger, 2024).

Di Maddaloni and Davis argue that the comprehensive and active involvement of stakeholders is a key factor for social sustainability in projects. They criticize the often one-sided focus of traditional stakeholder management on influence and external interests. Instead, they propose a co-creative approach that integrates stakeholders into decision-making processes. This perspective should not only improve the social impact of projects, but also ensure the acceptance and long-term success of projects. The authors argue that this requires a profound transformation of the project culture (Di Maddaloni & Davis, 2024).

Keeys sees projects as dynamic learning episodes that support organizations in integrating sustainability into their strategic approaches. She emphasizes that sustainability is not a static concept, but must be continuously adapted to changing conditions and requirements. The author identifies five key dimensions: Corporate guidelines, resource management, life cycle orientation, stakeholder engagement and organizational learning. These dimensions form the basis for systematically anchoring sustainability in operational and strategic processes (Keeys, 2024).

Silvius and Schipper analyze the diverse interactions between sustainability and project management. They show that sustainability influences both the way in which projects are carried out and the sustainability of the project results themselves. ESG perspectives add new dimensions to the traditional project management approach, including broader stakeholder management, a risk-based approach and greater consideration of long-term effects. The authors emphasize that these perspectives offer not only challenges, but also opportunities for innovation and value creation (Silvius & Schipper, 2024).

Obradovic and colleagues develop a comprehensive framework for integrating circular economy principles into project management. They categorize so-called "R-strategies" such as Reduce, Reuse and Recycle along the project lifecycle and show how these can be embedded in different phases of a project. Their CEPrM framework offers practical guidance for organizations that want to implement their sustainability goals through projects. The authors emphasize that the successful implementation of such strategies requires close collaboration between all project stakeholders (Obradovic et al., 2024).

Martens and Carvalho expand the definition of project success to include social and ecological dimensions. In addition to traditional parameters such as time, cost and quality, they argue that sustainable

projects are defined by their contribution to social and environmental value creation. They identify key areas such as innovation management, environmental commitment and social responsibility, which form an extended project success framework. The authors emphasize that this approach requires a long-term perspective that goes beyond the immediate project benefits (Martens & Carvalho, 2024).

Eskerod and Huemann present six principles for a sustainable stakeholder orientation. These include the inclusive definition of stakeholders, transparency in value communication, fairness in cooperation and a future-oriented perspective. The authors emphasize that these principles should not only be understood as theoretical guidelines, but also as practical recommendations for action. They emphasize that a sustainable stakeholder orientation is essential in order to optimize project results and promote long-term relationships (Eskerod & Huemann, 2024).

Silvius and Marnewick analyze how project managers can be motivated to implement sustainability goals. They identify three main factors: intrinsic motivation, task-related requirements and pragmatic approaches. The authors show that intrinsically motivated project managers often take on a pioneering role and view sustainability as a personal value. Pragmatists, on the other hand, use specific tools and knowledge to effectively embed sustainability in their projects. This differentiated approach offers insights into the different motivational structures and their impact on practice (Silvius & Marnewick, 2024).

Borg and colleagues analyze how sustainability can be optimized in construction projects. They describe detailed processes that can be applied at every stage of the project life cycle, from planning to implementation and post-occupancy. The authors highlight how innovative technologies, sustainable standards and life cycle cost analysis can be used to minimize the environmental impact of construction projects. They argue in favor of a stronger integration of sustainability goals in the early project phases to ensure their long-term success (Borg et al., 2024).

Mottee carries out a fundamental expansion of the classic "magic triangle" of project management. He develops the concept of the "Iron Pentagon", which incorporates social and environmental dimensions. This model offers a holistic perspective on sustainable projects and emphasizes the importance of management commitment, stakeholder engagement and sustainability metrics. Mottee argues that the Iron Pentagon is a practical extension of existing frameworks and can help organizations achieve their sustainability goals more effectively (Mottee, 2024).

In summary, it can be stated that the two current publications are particularly helpful due to the detailed presentation of how sustainability criteria can be embedded in various phases of project management - from planning to implementation and follow-up. The *IPMA Sustainable guide for Project Management* describes the integration of sustainability aspects in contextual, technical and social competences. It presents approaches that are based on key competence indicators and cover both theoretical and practical dimensions.

The discussion of current research findings in Silvius & Huemann (2024) also shows innovative perspectives, such as the CEPrM framework for the circular economy or the concept of the "Iron Pentagon". These add social and ecological dimensions to traditional project management models and emphasise the importance of long-term value creation.

Conclusion

Distinguishing between ecological, economic, and social sustainability in PM is challenging due to their interlinked nature. Both project outcome and process should be considered under sustainability principles, although current focus is mainly on outcomes. Despite increasing attention and discussion on sustainability in PM, practical implementation guidelines are lacking.

Adapting existing standards is the preferred approach, supported by the relevant knowledge among project managers. Organizations need clear definitions and integration of sustainability in their strategies, promoted by management, for successful implementation.

Integrating sustainability in PM offers long-term benefits, such as efficient resource use, stakeholder involvement, and strategic alignment with legal and stakeholder demands. However, holistic integration methods are yet to be developed. Further research is needed to explore practical applications and promote sustainable development through PM.

The latest publications (Silvius & Huemann, 2024; IPMA, 2024) are characterized by a systematic approach and well-founded scientific references, providing relevant impetus for both research and practice. Nevertheless, the practical implementation of the approaches presented remains a challenge, particularly with regard to the necessary change in organizational culture and the comprehensive involvement of all stakeholders.

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Über die Autoren

Prof. Dr. rer. oec. **Claus Hüsselmann** wirkte nach Studium der Technomathematik zunächst als leitender Entwickler in einem SAP-Systemhaus. Bei Scheer verantwortete er anschließend 20 Jahre lang mehrere (Groß-) Projekte, den Bereich Project Operations & Risk Control für das Consulting-Geschäft sowie als Partner den Beratungsgeschäftsbereich Project Performance Management. 2012–2015 war er als Vorstand der Deutschen Gesellschaft für Projektmanagement, GPM, engagiert. Seine Schwerpunkte umfassen u.a. das Projektportfoliomanagement (Ko-Leitung der GPM-Fachgruppe Multiprojektmanagement) sowie hybride PM-Ansätze (Lean PM).

Peter Kühn sammelte nach seiner Ausbildung zum Informations- & Telekommunikationssystemkaufmann erste Erfahrungen im Vertrieb und der Projektierung als Assistent der Geschäftsleitung. Er war anschließend mehrere Jahre als technischer Mitarbeiter in den Bereichen Produktion, technischer Außendienst und Entwicklung tätig, bevor er sein Studium Wirtschaftsingenieurwesen (B. Sc.) absolvierte. Seine Abschlussarbeit wurde mit dem Deutschen Studienpreis Projektmanagement prämiert. Neben dem Studium arbeitete er als studentischer Mitarbeiter an der Hochschule in den Bereichen Projektmanagement und SAP. Der Schwerpunkt seiner Praxisphase lag in den Bereichen Nachhaltigkeit und Energiemanagement.

Der vorliegende Arbeitsbericht fußt auf einer Bachelorthesis, welche im Wintersemester 2023/2024 im Fachbereich Wirtschaftsingenieurwesen der THM, PPM Labor für Projekt- und Prozessmanagement, entstanden ist.

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