Think Twice to Achieve a Sustainable Project Management

Subjects: Management

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This work aims at contributing to a new Sustainable Project Management (SPM) paradigm, focusing on the role of project managers as a key element. The contribution of this research has both practical and theoretical implications. It presents the first results of a project developed under the Erasmus+ program Think Twice, recommending a set of ecological practices to motivate and develop project managers' skills to adopt Sustainable Project Management. Subsequently, supported by a literature review and content analysis of the data collected for this project, an original conceptual model is presented: the Project Management Triple Sustainability Cube. This tool is intended to guide project managers on their journey to sustainability in project management, comprehensively and systematically. To this end, the tool outlines guidelines for adopting comprehensive practices according to the triple bottom line sustainability vectors (environmental, social, and economic) relating to people, processes, and innovative solutions (go/no digital) throughout the project life cycle.

project management   digital era   smart management   sustainability

1. Sustainable Development

The most widely used definition of sustainable development states that sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

The World Commission on Economic Development (WCED) indicated that sustainable development should simultaneously embrace economic, social, and environmental principles. Thus, the three axes of sustainable development are social (to ensure that all members of society have equal access to resources and opportunities), economic (a population's access to a certain minimum degree of satisfaction of their basic needs), and environmental (preventing human activity from degrading the environment) [1].

The United Nations (UN) and its member states, in 2015, launched the 2030 Agenda for Sustainable Development, supported by 17 Sustainable Development Goals (SDGs) [2]. This commitment was entitled "Transforming our world: the 2030 Agenda for Sustainable Development" to ensure the implementation of sustainable development principles by means of a collective effort to ensure the accountability and involvement of all member states. In addition to defining the SDGs, the 2030 Agenda also identified the resources needed for its implementation, such as financial resources, development technologies, and capacity building of local agents for sustainable development [3]. The 2030 Agenda aims to guide member states to develop inclusive, people-centered, and

sustainable development strategies, strengthening sustainable development's social, economic, and environmental dimensions. Its implementation requires a more holistic, coherent, and integrated approach at the national, regional, and global level [4].

To achieve the essential SDGs, more effort is imperative regarding changing individual behaviour and adopting more sustainable production processes, avoiding the scarcity of natural resources on behalf of future generations, otherwise economic growth will increase global pressure, social exclusion, and inequality. Consequently, companies should seek to adopt sustainable production methods, to develop practices and technologies designed to transform materials into products through the consumption of smaller amounts of energy and non-renewable or toxic materials, reducing emissions and waste [5]. In this sense, it is pertinent to analyse how companies may manage sustainability from a corporate perspective.

2. Corporate Sustainable Management

Companies have a key role to play in the achievement of SDGs. For this, it is necessary to commit to corporate sustainability, making it an integral element of competitive advantage strategy.

A study developed by Kiron et al. [6] revealed that 90% of managers assume sustainability as a crucial factor in their business. However, only 60% of companies implement an integrated sustainability strategy in their organization. Considering these results, there is a need for more concrete guidance to allow companies to act strategically and successfully towards sustainable development [7]. Sustainable management practices help organizations to avoid risks and identify opportunities, pointing out a sustainability profile [8]. The integration of sustainability into business contexts was driven by the development of the Triple Bottom Line model, which gained popularity with Elkington [9]. This author concluded that responsible management encompasses three dimensions of sustainable development: environmental, social, and economic. First, corporate sustainability management must be operationalized on principles of transparency and involvement of the main stakeholders, later translated into operations management.

Silva and Gouveia [10] present a conceptual model identifying the key elements of corporate sustainability management. They argue that sustainability management is based on a temporal concept, leading to reflection about the future. It is necessary to outline a long-term perspective supported by proactive management practices, mitigating risks and enhancing opportunities. An organization must understand its purpose from a systemic perspective, considering the set of relevant stakeholders and evaluating mutual impacts. They point out the concept of a permeable system where an organization must manage changes arising from an external context. They emphasize that leadership is crucial for the involvement of everyone in a culture oriented towards economic, social, and environmental sustainability objectives. Strategic management supporting sustainability should flow out to the organization's operations in four main stages: Involvement (targeting employees and other stakeholders); Execution (implementing actions at the tactical management level to improve economic, environmental, and social results); Monitoring (development of indicators to assess results); and Communication (reporting results to stakeholders, developing feedback mechanisms, and improving the results obtained).

To promote a strategy based on sustainability, organizations must look for complementary tools to support management, namely, the integration of sustainability in their management practices already implemented, such as the integration of sustainability in the processes of project management.

Labuschagne and Brent [11] present a definition of sustainability in business: "For the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future." In this context, for business, the challenge is to align operational processes with the main objectives of sustainable development, using practical tools to align business methodologies with the sustainability goals and life cycle management principles.

3. Sustainability in Project Management

One potential area for the implementation of sustainability is sustainable project management [12]. Sustainability has proved to be an emerging theme in PM knowledge, both in academia and the organizational field. In the academic sphere, most contributions have focused on understanding the impacts of the integration of sustainability in project management processes and practices[13], [14], [15] . At the organizational level, this effort has also been highlighted. For example, the IPMA Individual Competence Baseline® version 4 has demonstrated the concern to integrate sustainability into management standards. Its latest edition clarifies the need to ensure that a project must comply with the principles and objectives of sustainability, and the project's impacts on the environment and society are also assessed. In addition, the ISO (International Organization for Standardization) in "ISO 21505:2017—Project, Program, and Portfolio Management", defines a set of guidelines for the governance of a project, namely: to improve accountability and transparency; engagement with stakeholders; reduce organizational risk; increase the likelihood of achieving sustainable results and respecting values; ethics and guiding principles [16].

As is often the case, emerging themes generate a wide range of concepts and perspectives which may not be properly aligned and may contribute to thematic confusion.

Thus, some efforts have been made to homogenize the concepts. Huemann and Silvius [17] describes Sustainable Project Management as "the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economic, and social aspects of the life cycle of the project's resources, processes, deliverables, and effects, aimed at realizing benefits for stakeholders and performed in a transparent, fair and ethical way that include proactive stakeholder participation." This definition may integrate two perspectives on the connection between sustainability and PM:

- "Sustainability by the project"—sustainability is considered in the specifications and design of the project outputs, considering the environmental, social, and environmental impacts of the project's deliverables.

- "Sustainability of the project"—sustainability is addressed in project management processes, such as identifying and involving stakeholders, purchasing processes, business case development, project monitoring, project risk

management, and project team building.

Therefore, it is not sufficient to evaluate the sustainability of project deliverables; the project delivery process must also be sustainable [18]. Both elements are interrelated, as Sustainable Project Management (SPM) covers the life cycle of the project, focused on the sustainability of the outputs generated as well as on the integration of sustainability in the project management processes [19], [20].

Klakegg [21] explains sustainable project management from a holistic perspective, including comprehensive criteria and planning that supports the flexibility of the project's delivery. For this, it is important to follow a bottom-line approach, including the relevant stakeholder expectations.

In the journey to embed sustainability in PM, several frameworks and practices have been developed. These contributions have emerged at the sectoral level, such as the framework developed by Corder, McLellan, and Green [22] in the mining industry or, as a more typical application, to assess social impacts on project life cycles.

Organizational maturity has been investigated in the integration of sustainability in PM [23]. Magano, Silva, and Martins [24] argue that this integration process should start with diagnosing PM maturity and thus identify the strengths and weaknesses that impact the development of sustainability practices throughout the management of a project. In harmony with this, other authors [25] have developed the local Government Project Management Maturity Model (LGPM3) framework.

4. Dimensions of Sustainable Project Management

As defended by several authors, sustainable project management should be implemented as a holistic package with different sustainability dimensions to create value through the project [26], [27] .

A systematic literature review of articles published from 1994 to 31 December 2018 was conducted, resulting in a total of 450 articles [28]. This analysis highlights the challenge of the integration of project management and sustainability from different perspectives. In this context, a five-dimensional approach emerged from the analysis. The dimensions are: corporate policies and practices; resource management; life cycle orientation; stakeholder engagement; and organizational learning.

Other authors [18] have also maintained that sustainability in PM can be analysed from different perspectives, such as product-related, process-related, organizational, and people perspectives. Additionally, companies must add sustainability into project management processes and shift from focusing on the Iron Triangle to wider effects [29]. Consequently, different dimensions of SPM can be identified and discussed, such as:

- Triple Bottom Line Dimension [30]

According to the literature, sustainability in PM covers multiple dimensions and meets the varying goals of different stakeholders [31]. Nevertheless, the empirical results review pointed out that, overall, the initiatives fail to meet the

three dimensions of sustainability (economic, environmental, social), avoiding assessing the trade-offs between the dimensions [32]. Several of the sustainable initiative sets focus on the environmental dimension over the social and economic dimensions of sustainability [33]. The environmental area is more regulated than the social vector, and this consequently increases pressure to set and meet environmental goals before others [26].

- Project Development Life Cycle Dimension

As described by Labuschagne and Brent , enterprises that are successful in terms of project management adopt a simple and well-defined project management framework, with a staged approach for all projects which includes identifying all relevant information about major activities and deliverables for each project phase. In this context, for Sustainable Project Life Cycle Management it is necessary to know the life cycles involved in a project and their interactions. Moreover, the use of practical tools which include sustainability within evaluation processes may allow connections to be made between business methodologies and the principles of sustainability.

Therefore, the primary project phases are critical to introduce innovative solutions and increase the total value generated by the project [34], [35]. In general, companies make some sustainability-related decisions quite early [36]. As also pointed out by Labuschagne and Brent , after considering the results of the project life cycle under the sustainability perspective, the stakeholders should define their priorities.

During the execution phase of a project, value activities may continue [35], information is updated, and decisions are made related to material choices, process steps, and resource consumption. There are several works on SPM dedicated to the initiation, design, and planning of project phases [37]. Still, restricting the focus of sustainable project management to these phases of projects is insufficient; the implementation and closing stages are critical for ensuring that the projects are developed in a sustainable way.

- Sustainability-oriented innovations dimension

Some authors [38] insist that value innovation should also take place regarding sustainability, as long as the innovative solutions are supported on all the dimensions of sustainability, economic, social, and environmental.

As innovations emerge with a significant role in framing sustainability in the project life cycle, sustainability-oriented innovations should be a driver to be covered in future research .

Sustainability concerns must be integrated into the innovation process to guide the development of innovations and guarantee that sustainability is taken into consideration [39].

5. The Pivotal Role of Project Managers in Sustainable Project Management—A New Paradigm

As mentioned in the previous sections, the integration of sustainability generates a new project management paradigm, leading to a shift in the mindsets of project managers towards sustainable development concerns. Thus,

this paradigm depends on how project managers are committed to this challenge and how they may even assume the role of changemakers.

Project managers have a privileged role in implementing the key elements of sustainability management in their projects [40]. For this, their skills must also be targeted in line with awareness about sustainable development [40], [41]. Therefore, the effort to integrate sustainability into PM depends on the behaviour and perceptions of project managers. The question that arises is how to boost project managers to commit to sustainability? Silvius [42] identified three main groups of stimulus patterns:

- Intrinsic motivations for project managers: these are related to the innate stimuli of each professional associated with their concerns for the planet, scarcity of resources, equal opportunities, social justice, and climate change. Sustainability is considered the "right thing", and therefore their motivations are not rewards, awards, or reputational gains. In this group, personal attitudes about sustainability predominate.

- Task-driven: in this category, the integration of sustainability in PM is pushed by the definition of sustainable requirements and objectives, such as contractual clauses with incentive policies to achieve these aims. Normative behaviours expected by others predominate.

- Pragmatic: these stimuli are very results-oriented, and therefore sustainability is integrated into PM when it adds value to project results. Sustainability is seen as an opportunity for the project.

In literature project managers are incentivate to integrate sustainability into their projects. In general, most of the managers surveyed reported that they incorporate sustainability into their activities due to their internal motivations as they believe that sustainability is a worthy pursuit. Thus, the results of these studies indicate that intrinsically motivating factors are the main incentives, rather than the other two sets of stimuli, as when the project manager has an intrinsic orientation towards sustainability, task-driven and pragmatic motivations have little significance. The research reinforces the importance of individual stimuli, as it concluded that these results do not depend on project typology, age, gender, or the type of industry in which the project is developed.

An essential factor for any initiative to integrate sustainability is training and education to develop skills, so this may be carried over to corporate strategies, action plans, and individual behaviour [43].

This research builds on some preliminary results from a European project focused on fostering and developing awareness of ecological sustainability concerns among project managers: The ThinkTwice project [44].

6. Discussion and Conceptual Contribution

The challenges of the 21st century include combating the severe climate changes accelerated by human action in the Earth's ecosystem and adapting humanity to energy and digital transitions, leaving no one behind. For these reasons, sustainability is the keyword nowadays.

From the late 1960s, the ecological impact of human actions has been questioned, and nowadays its relevance to the fragility of the planet's sustainability is evident. Nevertheless, given the importance of this ecological aspect, several authors insisted that the sustainability concept should go wider and be made more comprehensive, including social and economic dimensions along with environmental factors. Therefore, one cannot act in relation to one aspect of this triple bottom line vector without influencing the others.

To respond to the current challenges, all the disciplines, all types of services, schools and academies, and rural and mechanical industries should acquire this triple global vision and adopt concrete measures, sometimes individually and sometimes as a group. The awareness of everybody's involvement is crucial to reach the desired end, and this awareness leads to changes in working processes and relational methods.

In the life cycle of product development and production, product managers have already been taking care of certain dimensions, including the ecological concerns, whether by limiting the use of certain types of raw materials, such as plastic, avoiding disposable materials, or offering alternatives for product destinations either by recycling the product or prepare it to act as a secondary raw material, ready for a new life. These actions widely adopted are not purely empirical but supported by the literature, for instance, the sustainability innovation cube of Hansen, Grosse-Dunker, and Reichwald [44] that adopts the triple bottom vectors approach to create a framework to evaluate sustainability-oriented innovations directed at encouraging product managers to act along the life cycle of a product, through manufacture, usage, and the end of the product's life.

This project intends to help promote the integration of environmental sustainability actions in project management daily practices. The results obtained so far were compiled as a set of practices oriented towards environmental sustainability, designated as the Curated Treasury. This list will allow project managers to make more conscious decisions about the impact of their projects with a similar project life cycle (as presented previously in **Table 1**). In addition, these practices promote the motivation of project managers to develop their projects in a more sustainable approach.

Table 1. Ecological sustainability project life cycle organization model.

Project Development Life Cycle * PDLC		
Management PDLC-M	Travel (3)	Footprint of transnational face-to-face meetings vs. online meetings Use terrestrial means of transport to arrive at transnational meetings Searching for synergies when travelling
	Building (6)	Reduction of organic waste and optimisation of heating costs and impact Installation of energy control system for buildings/apply sustainable solution for heating the workplace Use of smaller units of renewable energy compared to conventional energy production facilities Provide some alternative solutions, such as transformation of toilets with septic tanks into dry toilets, including recycling of brown, yellow,

Project Development Life Cycle * PDLC		
		and grey water Use of free water/saving tap water
	Digital (2)	Cameras off during online meetings Impact of email attachments on energy consumption
	Tech (3)	Prolong the lifetime of a product and reduce your environmental footprint Choose products that allow you to prolong their lifetime and reduce your environmental footprint Preventing tech waste through cloud computing
	Office (9)	Choosing sustainable office supplies, minimising waste Sustainable or recycled office supplies Less printing, more energy efficient printers Using recycled paper Recyclable food packaging Creation of plant-based plastic products Reusing ink cartridges and toners Replacing plastic bottles with glass bottles Green procurement
	Other (1)	Use grants to fund investment in environmentally friendly practices
Implementation PDLC-I	Working at your PC (3)	Green search engines/ Work offline when possible Sharing printed documents: copy or scan?
	Transport/ Commuting (3)	Carpooling Familiarise project managers with eco-friendly methods of movement (positive and negative aspects) Working from Home (online management solutions)
	Daily office routine (2)	Reduce water consumption at your workplace Zero-waste offices and coffee breaks
	Communication/ awareness (3)	Raise awareness and make sustainability every employee's responsibility Nurturing a sustainable mindset Work and meet in nature-focused co-working spaces
	Other (1)	Tech Symbiosis—Upcycling tech for the implementation of training and digital competences-oriented activities
Dissemination PDLC-D	Multipliers (3)	Ecological sustainability of online multiplier events compared to physical events Sustainable catering Sustainable event management, starting with transfer to and from the event, accommodation, local transport to the venues, and materials

Project Development Life Cycle * PDLC		
Physical aspects (1)	Reduce waste impact on the environment by adopting upcycled/recycled "gadgets" for project dissemination purposes	
Digital (6)	Green databases are intended to provide information about companies whose activities, products, or services contribute to reducing negative environmental impacts Spring-clean your photograph folder Prefer "green" servers for websites, e-mail/use your digital marketing in a greener way Cooperation in grouping websites under one platform Reduce the environmental impact of online presence and raise awareness of websites' carbon footprints	
Evaluation Prcess PDLC-E / Evaluation Process (8)	Include sustainability-related questions in your evaluation Include environmental impact in your risk assessment plan Use online-based monitoring and evaluation questionnaires Use evaluation questions to inform sustainable exploitation plans Integrate sustainability criteria and measurable indicators into the quality assurance plan Circular economy and design thinking Measuring impact of a sustainably implemented project on beneficiaries' intended future behaviour Time banking in sharing economy	

Sustainability Dimension	PDLC Management	PDLC Implementation	PDLC Dissemination and Evaluation
Ecological	An extensive list of good practices **Table 1**		

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* More detail offered in the Think Twice Curated Treasury of good practices for ecologically sustainable project management can be found at https://thinktwice.management/toolbox, accessed on 7 November 2021.

The PDLC approach avoids initial enthusiastic ecological intentions that will fade or be forgotten in the management and implementation phases. Adopting sustainable practices supporting the project's life cycle contributes to the integration of sustainability in PM, not only comprehensively but systematically.

With the Think Twice results, the project manager is challenged to commit all stakeholders to act in conformity to ecological sustainability along the project development life cycle. What about the other two triple bottom dimensions, though?

With this question in mind and with the project results as a starting point, the authors identify an opportunity to go beyond the ecological analysis achieved by the TT project. By applying the same methodology as before, the scope of the analysis was expanded towards the triple bottom line sustainability approach to complement the project manager's good practices.

The next section describes the conceptual model that led to a more extensive list of good practices for project managers where the other two sustainability dimensions were included. The three sustainability dimensions approach was called the project management triple sustainability cube (of good practices).

Conceptual Model to Assess Sustainability Dimensions in PM

The classification of sustainable practices catalogued by the project Think Twice could be an important contribution to stimulate the sensitivity and awareness of project managers, convincing them to adopt relevant attitudes towards sustainable goals in project development. However, it is limited to only one sustainability dimension, the ecological dimension.

To extend the range of the list of the TT's Curated Treasury of good practices towards the triple bottom line sustainability vision, the list was revisited and reorganized, and a conceptual model was built to reach this vision.

The first approach to the findings led to the emergence of a second dimension combining the ecological practices into families of related actions, named the variable dimension. Those variables are V01, Processes Green Indicators; V02, People and Systems; and V03, Go/No Go Digital or Innovation.

The group V01 corresponds to the ecological practices that are general to an organization and not specific to a given project. Instead, they are transversal actions or decisions that concern, not a specific project manager, but the organization that leads the project development.

Inside this category are actions such as those regarding workplace conditions or choices about team mobility and accommodation. An example of this kind of decision might be: How can the project manager choose the most environmentally friendly hotel for his international team to meet at?

Such V01 good practices should be seized by specific indicators and that's because they were labelled as PGI (Process Green Indicator)—Process Green Indicators. These indicators should be objective and measurable to support the PM's decision when adopting V01 practices in answering questions like: How can I compare different hotels concerning their ecological consciousness?

At this point, a new study area is identified for further research. Taking this example, one can suggest the creation of new accommodation green metrics, such as the ones used at home for appliance energy indicators A++, A+ … Hotels (or even transport methods, mutatis mutandis), then, could be labelled as (say) 4-star A++.

The group V02 corresponds to practices that refer to the impact of the actions of the team in the development of a certain project and how they affect the processes and systems that are used.

These can or cannot be generalized to the organization and are specific to the decision of the project manager along the PDLC. As an example of this group of practices, one can have, for example: Should I print all the intermediate reports or leave them in a repository and print only the final one?

Here, also, objectivity is imperative to decide among different options. Even though some of these decisions are common sense, they should be supported with the most objective indicators possible.

Finally, V03 concerns the specific project and includes all the practices that bias team decisions to use digital alternatives instead of physical solutions. This vector was named the Go/NoGo Digital dimension. This dimension

may also be called digital innovation and is intended to guide project managers in choosing the border limits between the physical and the digital world.

These new classifications allow the development of a two-dimensional classification along the life cycle. Each one of the actions under the scope of the new variables V01, V02, and V03, can be equally adopted along the project's life cycle (**Table 3**).

Table 3. Two-dimensional classification aligning variables and project life cycle.

| Sustainability Dimension | Project Development Life Cycle | | |
	PDLC Management	PDLC Implementation	PDLC Dissemination and Evaluation
Ecological	V01: Process Green Indicators		
	V02: Processes and System		
	V03: Go/NoGo Digital		

Note that at this point the four PDLC stages adopted in the Think Twice project were reduced to three, as the Dissemination and Evaluation phases were grouped.

So far, the exhaustive list of ecological good practices was reorganized along with a bidimensional conceptual model based on the project life cycle and a new family of variables described above.

The next step towards a complete list of good practices based on the holistic triple bottom line vectors of sustainability adds all three vectors to the developed conceptual model: the ecological sustainability vector (EcoS), the social sustainability vector (SocS), and the economic sustainability vector (EncS) (**Table 4**).

Table 4. The complete conceptual model for sustainable project management.

| Sustainability Dimension | Project Development Life Cycle | | |
	Management (PDLC-M)	Implementation (PDLC-I)	Dissemination and Evaluation (PDLC-DE)
Ecological (EcoS)	V01: Process Green Indicators		
	V02: Processes and System		
	V03: Go/NoGo Digital		
Social (SocS)	V01: Process Green Indicators		
	V02: Processes and System		
	V03: Go/NoGo Digital		

Sustainability Dimension	Management (PDLC-M)	Project Development Life Cycle Implementation (PDLC-I)	Dissemination and Evaluation (PDLC-DE)
Economic (EncS)	V01: Process Green Indicators		
	V02: Processes and System		
	V03: Go/NoGo Digital		

One can describe and number the scope of the observed dimensions in **Table 5**.

Table 5. The complete conceptual model number matrix.

Project Development Life Cycle			Variables			Triple Bottom Line Dimensions		
PDLC-M	PDLC-I	PDLC-DE	PGI	P&S	GNgD	EcoS	SocS	EncS
1	2	3	4	5	6	7	8	9

The introduction of the new vectors of sustainability dimensions requires the incorporation of an extended list of project management best practices concerning the social and the economic aspects of project development life cycle stages and variable dimensions. Subjects such as child labour, fair trade, or extremely low wages should be addressed at this time.

The complete conceptual model based on the three dimensions is now a 3D model in all the dimensions numbered above. This will allow the new Curated Treasury to be redistributed according to its target dimensions (**Figure 1**).
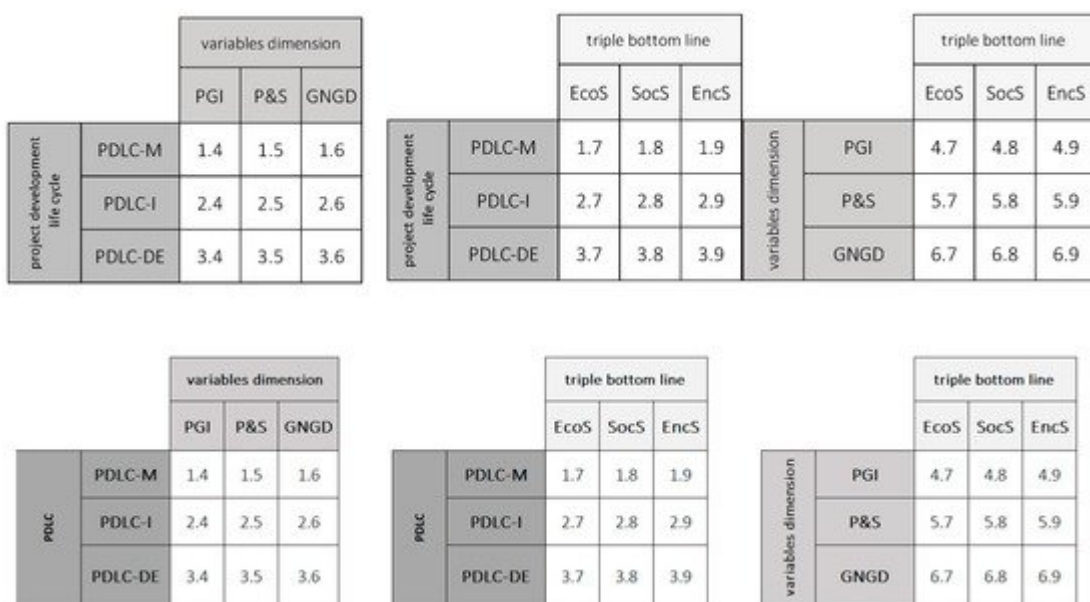

Figure 1. Correlation among the model dimensions, PDLC, variables, and sustainability.

To better picture the model and easily find the axis of action, the three conceptual dimensions are depicted in a 3D view that represents the Project Management Triple Sustainability Cube (**Figure 2**).
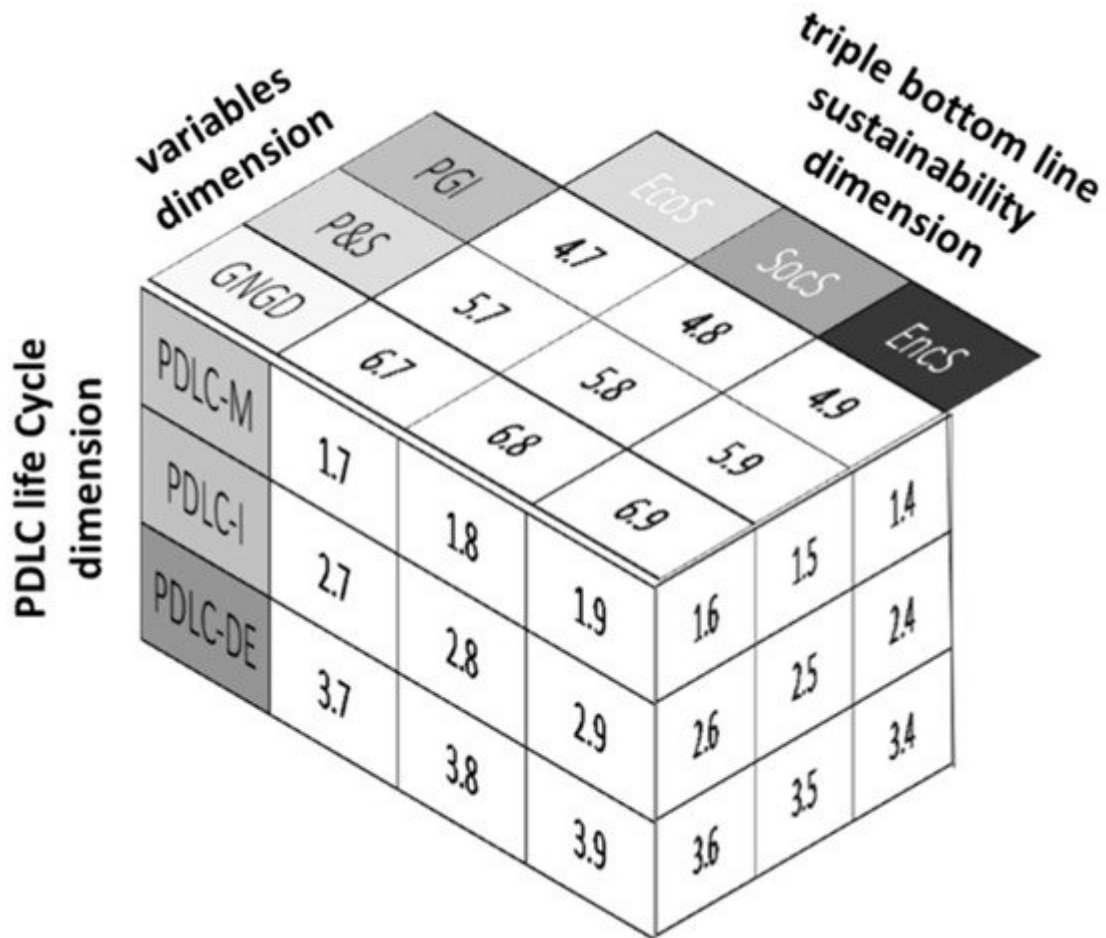

Figure 2. The project management triple sustainability cube of good practices.

The Project Management Triple Sustainability Cube model is a conceptual model that shows the transversality of three interrelated dimensions of sustainable project development along the project life cycle. It identifies 3 × 9 individual areas of sustainability procedures that may be adopted by project managers in each project development.

By adopting this methodology and achieving a group of 27 practices, each project manager could objectively identify the adoption of each group of best practices along each axis and at each stage of project implementation. By highlighting each of the 27 sustainability areas in which actions were taken in a certain project, project managers can improve and forecast improvement areas for current and subsequent projects.

The Project Management Triple Sustainability Cube outlines guidelines for adopting comprehensive practices in relation to the triple bottom line sustainability vectors (environmental, social, economic) concerning people, processes, and innovative solutions (go/no digital) along the project development life cycle to support the decision making of sustainability-concerned project managers.

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