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## REVIEW OF LITERATURE MODELS THAT ADDRESS SUSTAINABILITY IN PROJECT MANAGEMENT

**Abstract:** *This article compared identified models in the literature that incorporates sustainability in project management, with an integrated model used as reference, mapping their points of similarity. For this purpose, bibliographic research of 90 articles from the Web of Science and Scopus databases was carried out, which address the themes of sustainability and project management. The reference model was compared with 16 models identified during the literature search, through comparative analysis and grounded theory. As a result, the study presents the identified similarity between model's constructs. It is concluded that there is no pattern or convergence between the different models identified, so that the reference model plays a role in stimulating the integration of sustainability with project management in a more comprehensive way.*

**Keywords:** *Sustainability; Sustainable Project; Project management; Sustainable Development Goals*

### 1. Introduction

Our current way of doing 'things' is not sustainable. The way we produce, organize, consume, live etc. in the present times can have negative effects in the future (Silvius and Schipper, 2016; White, Habib and Hardisty, 2019). Since the industrial revolution our economies have developed a pattern of growth, a linear model of taking, consuming and disposing of resources based on the assumption that they are plentiful, available, easy to obtain and cheap to discard. Demand and competition for finite and sometimes scarce resources will continue to increase, and pressure on resources is causing further environmental degradation. It is possible to benefit economically and environmentally through better use of available resources (European Commission, 2014; Prieto-Sandoval et al., 2018).

As a project is a temporary endeavor undertaken to create a unique result; its deliverables – products or services – can have social, economic and environmental impacts that exceed the execution time of the projects themselves. The management of sustainable projects must be observed considering two environments: internal to the project - which uses the organization's resources and consists of a flow of inputs, processing and outputs - and the external of the organization promoting the project - formed by entities, markets and by the strategy of the organization itself where the project is developed (Lobato, 1997; Oliveira, 1995; PMI, 2017; Sanchez, 2015). How sustainability can be addressed in project and product development practices is not always clear, the inclusion of sustainability aspects in these demands a complete understanding of the complexities of each analyzed scenario, of each project (de Magalhães;

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Danilevicz; and Palazzo, 2019).

Most of the studies that address the subject of this research are concentrated in the areas of civil engineering, infrastructure and construction, and most of them are interpretive, which seek to make sense of how sustainability concepts can be understood in the context of projects. Few of them are normative, seeking to understand how sustainability should be incorporated into projects. Studies provide the ingredients but no clear recipe (Silvius and Schipper, 2010; Schipper and Silvius, 2017; Yu et al., 2018), and the present study also seeks to fill this gap.

It is in this context that this research proposes to use as reference the model proposed by Toledo (2020), that indicates the use of sustainable project management methodology by sustainable companies and project managers considering and addressing the sustainable development goals achievement and being supported and influenced by stakeholders. This reference model will support the identification of the model or models that reconcile the vision of experts in project management with the result of the bibliographic research carried out, seeking to answer the following research question: "What are the model or models, applied to project management, that incorporates and stimulates more broadly the delivery of sustainable projects?".

Although the number of studies on the subject is growing, based on the bibliographical research carried out, a relative scarcity of available literature was identified, which is concerned with directly integrating sustainability with project management. The contribution of this article lies in the identification as reference of a comprehensive and unique model; which lists the main variables that support and influence the incorporation of sustainability in project management, comparing it to 16 other models identified in the literature review, contributing to the discussion of the integration of sustainability in project management.

## 2. Reference Model

This section introduces the reference model constructs shown in Table 1 and the statistically validated reference model presented in Figure 1.

### 2.1. Sustainable Project Management - Adoption of Sustainable Practices by Companies

According to Silvius et al. (2017), sustainability means the maintenance of nature's capacity to produce or generate resources permanently and constantly. In an analogy with the financial market, it means consuming income and not capital. From a social perspective, it is about organizations exhausting people's capacity to produce or generate work or knowledge due to physical or mental exhaustion.

Edwards (2009) states that large organizations can present a very contradictory sustainability profile in situations of environmental instability and vulnerability. This can be evidenced in the behavior of multinational organizations, in their operations in Third World countries. In response to very weak regulatory environments, companies can act at a pre-conventional stage of organizational sustainability and, at the same time, in their home countries, they can act to much higher standards.

Despite significant progress, corporate sustainability has reached a crossroads. In one direction, corporate sustainability leaders remain a minority, and are unevenly distributed across geographies and industries. In the other direction, a group of prominent companies are demonstrating that sustainability can be the driver of innovation, efficiency and lasting business value (Kiron et al., 2017).

## **2.2. Sustainable Project Management - Sustainable Project Delivery**

It is especially important that all numbers and Although much scientific research attention has been directed towards sustainability-oriented performance indicators and evaluation, little is known about sustainable project management, ie, the practices with which projects are controlled to ensure the achievement of their sustainability goals (Kivilä, Martinsuo and Vuorinen, 2017). Sustainable project management implies the use of practices that ensure the social, ecological and profitable delivery of the project; so that their deliveries are socially and environmentally acceptable, throughout their lifecycle (Silvius and Schipper, 2014).

As proposed by Rumaithi and Beheiry (2016), the green project management process involves elements and suggestions to be added to the traditional and well-known project management processes, in order to use resources for the benefit of society or for the achievement of an objective that serves the different stakeholders. The objective of the green or sustainable project management process is to reduce long-term risks and costs, preserving the environment and preventing it from any negative impact on projects, in order to make them more attractive to investors.

The concept of sustainable design (Silvius and Schipper, 2014; Rumaithi and Beheiry, 2016; Silvius et al., 2017) must be aligned with the concept of the sustainable product lifecycle and the project itself, influencing the production/assembly phase, maximizing the use/maintenance phase and promoting reuse/recycling, also needing to consider a sustainable purchasing chain in the product conception, design, production and assembly phases.

## **2.3. Sustainable Project Management - Sustainable Project Management Methodology**

Temporary organizations and projects represent a common and important part of contemporary economic and social life. Efforts to renew businesses and change operations in existing companies are organized as projects (Lundin and Söderholm, 1995). A project is a temporary effort undertaken to create a unique product, service or result (PMI, 2017), and the main standards for project management are: PMBOK Guide, PRINCE2, ISO 21500 and IPMA.

PRINCE2 is the leading standard for project management in Europe (Zoete, 2010). The PMBOK Guide is often considered the most influential standard for project management, due to the distribution of the guide and because of the popularity of the professional certification process in project management (PMP certification). In turn, the PMBOK guide recognizes five groups of project management processes: Initiation processes; Planning processes; Execution processes; Closing processes; Monitoring and control processes.

ISO 21500 was published as a result of a development process to create a “common frame of reference and a standard process, which is intended to be comprehensive for all project management standards and concepts.” (Legerman et al., 2013, p.1). By the way, ISO 21505 (International Organization for Standardization, 2017) explicitly refers to sustainability in the context of project management; stating that “the governance of projects, programs and portfolios must reflect the organization's commitment to ethical values and sustainability” (Silvius, 2017, p.1489).

From the IPMA perspective, sustainability can be seen in terms of effects on the environment and the longevity of results. It is achieved through the continuous delivery, monitoring and use of project results, to

govern the objectives, increase people's commitment, adopt adequate processes and ensure the best use of resources (IPMA, 2016).

Sustainable project management involves the project manager considering not only the economic capital, but also the social and environmental capital of the organization, thus ensuring its future production capacity (Silvius et al., 2017; Kivilä, Martinsuo and Vuorinen, 2017). A holistic view of project control is needed to make sustainable project management successful, creating sustainable value through the project. Sustainable project management implies the use of practices that ensure that project delivery is socially, financially and environmentally acceptable throughout its lifecycle (Silvius and Schipper, 2014; Kivilä, Martinsuo and Vuorinen, 2017).

According to Banihashemi et al. (2017), the incorporation of sustainability in project management practices refers to the comprehensive and harmonized assimilation of social, economic and environmental principles: the Triple Bottom-Line (TBL) of sustainability. In the same vein, according to Rumaihi and Beheiry (2016), the green project management process involves elements and suggestions to be added to the already known and consolidated traditional project management processes, with the aim of using resources for the benefit of society or for the achievement of a goal.

#### **2.4. Stakeholders (Interested Parties)**

According to the PMBOK Guide (2017), stakeholders are an individual, group or organization that can affect, be affected, or feel affected by a decision, activity or result of a project. Considering a company, a corporate stakeholder can be any group or entity that has an effect on corporate behavior and is, in turn, affected by it. Stakeholders can be internal or external to the project and can be actively involved, passively, or even unaware of the project. The main stakeholders considered in the

model, but not limited to only these, are: government, market, customers, employees, suppliers, shareholders, society, local community, project managers and project team (Wieland and Fitzgibbons, 2013).

The growing public and market pressures – which are important stakeholders in any project – for the adoption of more conscious business practices from a social and environmental point of view, supported the emergence of the concept of corporate sustainability. Thus, it is not wrong to say that incorporating sustainability into projects meets a demand from society (Wieland and Fitzgibbons, 2013; KPMG, 2017). Considering the American context, although there is a lack of regulation requiring the disclosure by companies of socio-environmental measures, there was an increase in the issuance of corporate sustainability reports; including managing stakeholder perceptions, which convey organizational values to the public, and establish legitimacy of measures (Cecil, 2010; Wieland and Fitzgibbons, 2013).

According to Badurdeen et al. (2009), conventional supply chain management practices have traditionally focused on obtaining products or services for the final consumer, with an open-cycle approach. To ensure simultaneous economic, environmental and social benefits in business operations will require a more holistic, systems-based and closed-loop approach to supply chain management. Thus, the approach must go beyond the 3R's – reduce, reuse and recycle – to the 6R's, which includes recovering, re-engineering and remanufacturing; being a new definition for the sustainable supply chain, which adopts the total lifecycle approach and TBL.

The creation of value across the entire supply chain, considering the 6R's approach, is a manifestation of a paradigm shift that will demand changes in the way society legislates, produces and consumes innovations, while drawing inspiration from nature to respond to social and

environmental needs, reflecting on project management (Russel, 2017; Prieto-Sandoval et al., 2018).

## **2.5. Sustainable Development Goals**

The sustainable development goals (SDGs) were created from the 2030 agenda for sustainable development and adopted by world leaders in September 2015, at the historic meeting of the Summit of Organizations that are part of the United Nations (UN). Over the next 15 years, starting in 2016, a great effort and focus from every country on the planet is expected to fight all forms of poverty, inequality and climate change, ensuring that no one is left behind.

Altogether, there are 17 SDGs to be followed by all nations on the planet: 1- Eradication of poverty; 2- Zero hunger and sustainable agriculture; 3- Health and well-being; 4- Quality education; 5- Gender equality; 6- Clean water and sanitation; 7- Clean and accessible energy; 8- Decent employment and economic growth; 9- Industry, innovation and infrastructure; 10- Reduction of inequalities; 11- Sustainable cities and communities; 12- Responsible consumption and production; 13- Action against global climate change; 14- Life in the water; 15- Terrestrial life; 16- Peace, justice and effective institutions; 17- Partnerships and means of implementation.

The development that has been taking place is unsustainable, bringing a series of problems and harm to society: health problems, less efficiency, community dissatisfaction, pollution, depletion of natural resources, impacting societies, economies and national policies (Halliday, 2008; Rumaithi and Beheiry, 2016). According to Berns et al., (2009), most sustainability actions carried out to date seem to be limited to those necessary to meet regulatory requirements.

According to Kuei et al (2015), to achieve sustainable development in the supply chain, regulatory pressures are essential. Governments in many countries are becoming increasingly involved in developing policies that advocate for sustainability, putting economic development above meeting sustainability requirements. The need to pursue economic growth fueled a huge demand for construction projects, eclipsing environmental concerns (Banihashemi et al., 2017; Berns et al., 2009).

Governments are primarily responsible for monitoring and reviewing, at national, regional and global levels, the progress made in implementing the SDGs. Setting national targets is the responsibility of each government, guided by the level of the global target, but considering national circumstances. The decision on how this ambitious and global objective should be incorporated into national planning, processes, policies and strategies is made by each government (United Nations, 2015). Along the same lines, Rumaithi and Beheiry (2016) point out the need for more support for the development of green and sustainable industry through the development of government policies.

Evidence shows that companies operating in developing countries only change their unsustainable practices if there is a proven return on investment (Du Plessis, 2007; Gan et al., 2015; Banihashemi et al, 2017). Companies that intend to remain in the market for the long term need to start reporting internally their actions regarding corporate responsibility for the sustainable development goals. When they consider the problems we face globally and understand how they can affect business models, both positively and negatively, they can adapt (KPMG, 2017).

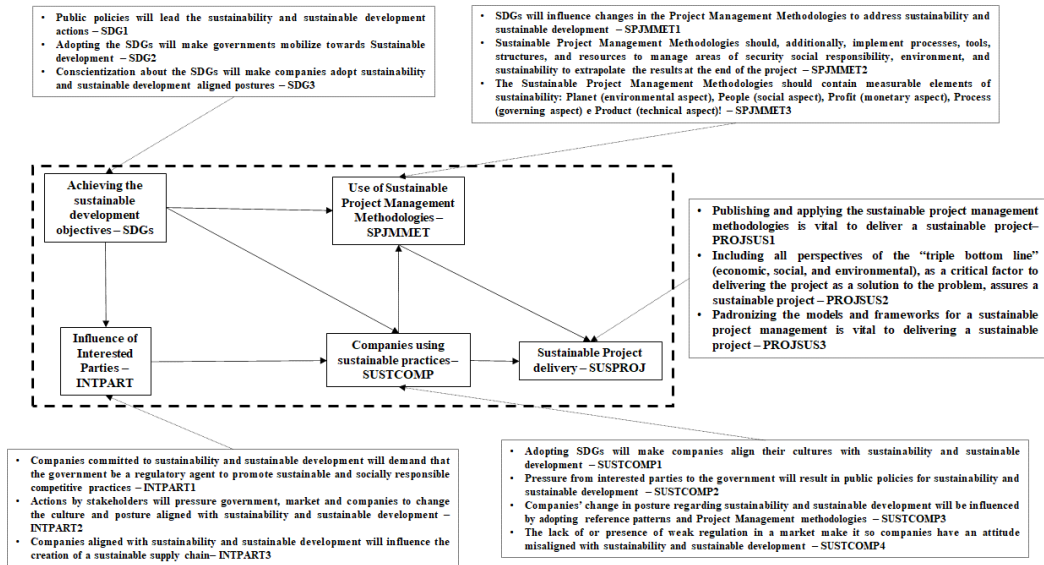


Figure 1. Reference Model (adopted from Toledo et. al, 2021)

Table 1. Constructs and manifested variables (Toledo et. al, 2021)

Constructs	Manifested Variables	References/Source
<b>Exogenous</b>		
<b>Sustainable Development Goals (SDG – 3<sub>i</sub>)</b>	Public policies (SDG1)	(Westkämper et al. 2001) (Rumaithi and Beheiry 2016) (Kuei et al. 2015) (Boston Consulting Group 2019) (Banihashemi et al. 2017)
	Government mobilization efforts (SDG2)	(Rumaithi and Beheiry 2016) (United Nations 2015)
	Companies behavior (SDG3)	(KPMG 2017) (Banihashemi et al. 2017)
<b>Endogenous</b>		
<b>Interested Parties (INTPART – Π<sub>i</sub>)</b>	Requirement for regulation by companies (INTPART1)	(Banihashemi et al. 2017) (Arts and Faith-Ell 2012) (Lenferink and Tillema 2013) (Commission of the European Communities 2004) (Russel 2017)
	Interested parties’ actions (INTPART2)	(Wieland and Fitzgibbons 2013) (KPMG 2017) (United Nations 2015)
	Sustainable supply chain (INTPART3)	(Prieto-Sandoval et al. 2018) (Silvius and Schipper 2014) (Brent and Labuschagne 2006) (Arts and Faith-Ell 2012) (Lenferink and Tillema 2013) (Commission of the European Communities 2004) (Russel 2017)

<b>Sustainable Companies (SUSTCOMP – Π<sub>2</sub>)</b>	Culture aligned with SDG (SUSTCOMP1)	(United Nations 2015)
	Interested parties demands (SUSTCOMP2)	(Silvius and Schipper 2014) Brent and Labuschagne 2006) (Kuei et al. 2015)
	Sustainable Project management methodology adoption (SUSTCOMP3)	(Martens and Carvalho 2016) (Silvius and Schipper 2016) (Silvius 2017) (Global 2019)
	Weak or non-existent regulations (SUSTCOMP4)	(Boston Consulting Group 2019) (Westkämper et al. 2001) (Rumaithi and Beheiry 2016)
<b>Sustainable Project Management Methodology (SPJMMET – Π<sub>3</sub>)</b>	SDG influence (SPJMMET1)	(United Nations 2015) (Labuschagne and Brent 2006) (Silvius and Schipper 2014) (Silvius et al. 2017) (Global 2015) (Global 2019)
	Sustainability process inclusion (SPJMMET12)	(Westkämper et al. 2001) (Kivilä et al. 2017) (Yu et al. 2018) (Carvalho and Rabechini 2017) (Silvius 2017) (Labuschagne and Brent 2005) (Silvius and Schipper 2014) (Global 2015) (Global 2019) (IPMA 2015)
	Measurable TBL elements inclusion (SPJMMET3)	(Kivilä et al. 2017) (Yu et al. 2018) (Carvalho and Rabechini 2017) (Silvius 2017) (Labuschagne and Brent 2005) (Silvius and Schipper 2014) (Global 2015) (Global 2019) (IPMA 2015)
<b>Sustainable Project (SUSPROJ – Π<sub>4</sub>)</b>	Dissemination and application of Sustainable Project Management Methodology (SUSPROJ1)	(Wieland and Fitzgibbons 2013) (IPMA 2015) (IPMA 2016)
	Inclusion of TBL as project critical success factor (SUSPROJ2)	(Lapinski et al. 2006) (Zidane et al. 2015); (Carvalho and Rabechini 2017) (Schipper and Silvius 2017) (Silvius and Schipper 2016) (Global 2015) (Global 2019) (IPMA 2015) (IPMA 2016)
	Standardization of models and frameworks for Sustainable Project Management (SUSPROJ3)	(Silvius and Schipper 2010) (Gareis et al. 2010) (Global 2015) (Global 2019) (IPMA 2015) (IPMA 2016) (Westkämper et al. 2001) (Eid 2009) (Silvius 2015) (Martens e Carvalho 2016)

### 3. Methodological Strategies

The methodological procedures adopted in the research and presented in Figure 2 can be divided into 2 parts: Phase I) Literature review, and grounded theory – to identify from the literature models and frameworks that incorporates sustainability in

project management (Tranfield et al., 2003; Flanagan, 1954; Dela Coleta, 2004), and Phase II) Comparative analysis and grounded theory – to compare the reference model and its constructs with existing models to confirm and identify points of similarity and potential contributions of the published model (Hsieh and Shannon, 2005;

Jarvis et al., 2003).

To comply with phase I, following the methodological recommendations of Treinta et al (2014), a literature search was carried out in the Web of Science and Scopus databases, based on the keywords tree presented in Figure 3, with the application of the Boolean expression shown in Table 2.

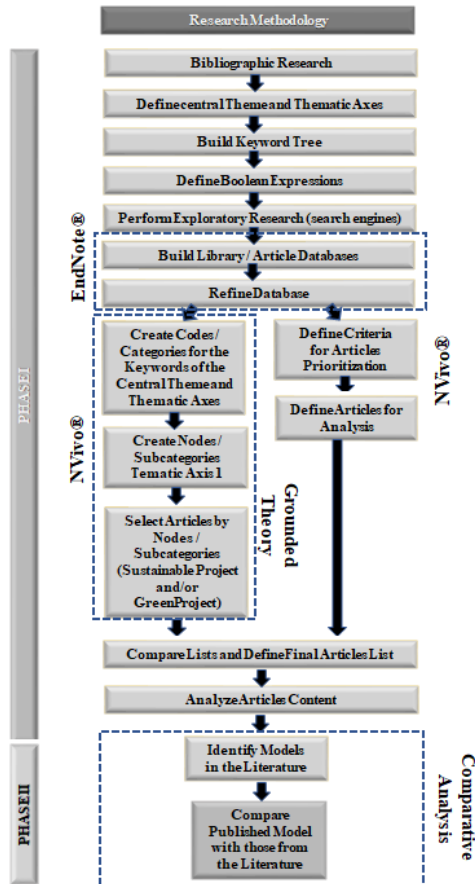


Figure 2: Conceptual model of the research methodology (adapted from Toledo, 2020)

A total of 7055 articles were obtained, which were exported and loaded into the EndNote software, with subsequent application of the following filters: 1) exclusion of duplicate articles; 2) exclusion of articles with missing information (author, journal, year, abstract and keywords); 3) exclusion of articles with a title out of scope; 4) At the end of the

refinement process, a total of 400 bibliographic records were obtained, to which the multi-criteria classification proposed by Treinta et al. (2014), prioritizing 60 articles from the 1st quartile of the sample for analysis; 5) In addition to the classification by the multicriteria method, the resources of the NVivo software were used to perform the lexical analysis of the 400 articles, seeking to explore their content, selecting - 57 articles - that were more related to the research topic.

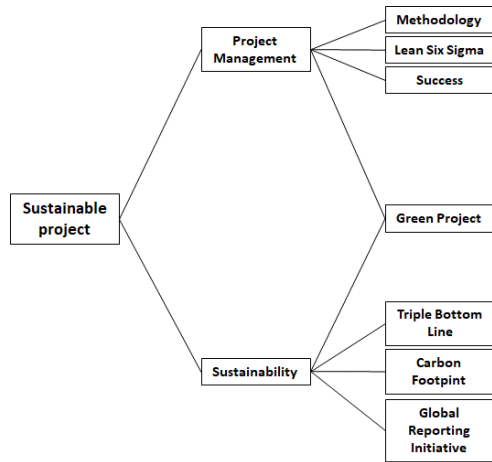


Figure 3. Research keywords tree (Toledo, 2020)

The combination of the two selections of articles generated the final database composed of 90 articles whose content was fully analyzed, supporting the theoretical framework of this research.

With support of Nvivo a lexical analysis was conducted over the database of 90 articles, searching for the keywords 'model' or 'framework', looking for identifying the articles that proposed models or frameworks for integrating sustainability with project management. As result of this analysis 16 articles were selected.

Phase 2 consisted of content analysis of the 16 articles obtained in the previous bibliographic research, which discussed and presented models that addressed sustainability in project management, with



the codification and categorization of their content. It was also possible to identify some similarity points with the constructs of the published model (Hsieh and Shannon, 2005; Jarvis et al., 2003). Therefore, the constructs of the reference model were considered as basis and reference, seeking to

identify how the 16 articles addressed the theme of sustainability in project management and how the constructs of the reference model were used. The content analysis considered the identification of constructs and variables of the identified models, whose results are shown in Table 3.

**Table 2.** Boolean expression x search result

Search	Data Base	Boolean expression	Filters	Documents
1st	SCOPUS	"project management" AND ( "methodology" OR "lean six sigma" OR "success" OR "green project" )	→ Document type: article → Language: English	3929
2nd	WOS	"project management" AND ( "methodology" OR "lean six sigma" OR "success" OR "green project" )	→ Document type: article → Language: English	1513
3rd	SCOPUS	"sustainability" AND ( "green project" OR "triple bottom line" OR "carbon foot print" OR "global reporting initiative" OR "integrated reporting" )	→ Document type: article → Language: English	924
4th	WOS	"sustainability" AND ( "green project" OR "triple bottom line" OR "carbon foot print" OR "global reporting initiative" OR "integrated reporting" )	→ Document type: article → Language: English	689
<b>Total</b>				<b>7055</b>

#### 4. Analysis and discussion of results

The published model referred on phase II of the methodology is shown in Figure 3 and considers the following critical factors (latent variables) for a project to be sustainable, in addition to presenting the suggested causal relationship between them: SDG, Stakeholders, Sustainable Companies, Sustainable Project Management Methodology and Sustainable Project.

In the published model, the Sustainable Development Goals - SDGs is the construct that starts the process of influence in the direction of sustainability for the Sustainable Companies, Stakeholders and Sustainable Project Management Methodology constructs, culminating in the conduct and delivery of a sustainable project.

Sustainable Companies and Stakeholders interact and adjust to each other to meet the SDGs, and influence the definition of critical success factors for delivering a sustainable

project.

In compliance with phase II of the methodological procedures, a comparative analysis of the reference model presented in Figure 1 was carried out, with the models for the integration of sustainability in project management identified in the literature review. Table 3 presents a summary of the main points identified in the models performing a structured literature review on the sample of 16 articles proposing models and frameworks. Table 1, on the other hand, summarizes the theoretical framework of the manifest variables associated to the constructs (latent variables) defined in the reference model, which allow a better understanding of it.

Finally, Table 4 presents the result of the comparison carried out between constructs of the reference model that support a sustainable project management and the identification of which of these were addressed in the 16 models identified in the literature and listed in Table 3.

Based on the literature, a sustainable project management pattern being more used was not identified, as well as the models and frameworks most used as reference have limited attention to the issue of sustainability in a comprehensive way.

**Table 3.** Summary of the main points of the constructs of the compared articles. (authors)

<b>Authors</b>	<b>What do they consider relevant to guaranteeing a sustainable project?</b>
Toledo (2020)	Use of sustainable project management methodology by sustainable companies and project managers considering and addressing the sustainable development goals achievement and being supported and influenced by stakeholders.
Gareis et al. (2010)	Risk reduction; Values and ethics considerations; Participation and capacity development.
Silvius e Schipper (2010)	Return on investment; Business agility; Transport; Energy; Waste; Materials and resources; Labor Practices and Decent Work; Human rights; Ethical behavior of society and customers.
Sarkis et al. (2012)	They consider the opinions and values of the stakeholders in the construction projects and for the delivery of a sustainable project, considering in the evaluation of suppliers used in the projects: Child labor; discrimination; long working hours; abuse of union rights; subsistence wages; social inequality; corruption.
Silvius e Schipper (2016)	Balancing or harmonizing economic, social and environmental interests; short-term and long-term guidance; local and global orientation; values and ethics; transparency and accountability; stakeholder participation; risk reduction; waste disposal; consuming income, not capital.
Tabassi et al. (2016)	Energy efficiency; Quality of indoor environment; Planning and managing sustainable sites; Materials and resources; Water efficiency; Innovation.
Martens e Carvalho (2017)	Management of stakeholders (society, employees, suppliers and contractors); Environmental policies and resource savings; Economy and competitive advantage; Sustainable business innovation model.
Carvalho e Rabechini (2017)	Project manager focused on sustainability; Green acquisition and partnership; Environmental technologies; designed for the environment; Social responsibility; Social and environmental performance; Project success; Project success control variables: Company size; Country; Industry; Project complexity.
Krajangsri e Pongpeng (2017)	Infrastructure assessment criteria: Environmental impacts on surrounding areas, transport, community, energy and water, location, project management, waste management and materials and resources; Project success criteria: environment, quality, safety, time, cost and customer satisfaction.
Banihashemi et al. (2017)	Identification; Evaluation; Commitment; Preparation in the organization; Project preparation; Implementation Evaluation; Preparation; Use.
Hosseini et al. (2018)	Key Contextual Factors Affecting the Sustainable Delivery of Megaprojects in Iran, in the phases: Assessing; Preparation; Use.
Krishnamurthy et al. (2014)	It considers the inclusion of sustainability education in Business Schools.
Zidane et al. (2015)	Ex-post evaluation of project criteria: Efficiency; Effectiveness; Relevance; Impact; Sustainability.
Svensson et al. (2016)	It proposes a framework for assessing sustainability in business, which includes 17 dimensions associated with the TBL elements: Economic; Social; Environmental.
Rumaithi e Beheiry, (2016)	Integration of green practices into generalized project management best practices.
Othman e Abdelwahab (2018)	Integration of risk management into the architectural design process as an approach to delivering sustainable construction projects.
Schipper e Silvius (2017)	Canvas to assist the project manager in developing a sustainability management plan, it includes: List of sustainability indicators; Sustainable development concepts.

**Table 4.** Comparison of the reference model construct’s that support sustainable project management with the other identified model’s constructs from the literature (authors)

Authors	Constructs that support a sustainable project management				
	Sustainable Development Goals	Stakeholders Influence	Companies using Sustainable Practices	Sustainable Project Management Methodology	Sustainable Project Delivery
Toledo (2020)	✓	✓	✓	✓	✓
Gareis et al. (2010)	✓				✓
Silvius and Schipper (2010)					✓
Sarkis et al. (2012)		✓			✓
Silvius and Schipper (2016)					✓
Tabassi et al. (2016)					✓
Martens and Carvalho (2017)		✓			✓
Carvalho and Rabechini (2017)					✓
Krajangsri and Pongpeng (2017)					✓
Banihashemi et al. (2017)					✓
Hosseini et al. (2018)					✓
Krishnamurthy et al. (2014)			✓		
Zidane et al. (2015)					✓
Svensson et al. (2016)			✓		
Rumaithi and Beheiry, (2016)					✓
Othman and Abdelwahab (2018)					✓
Schipper and Silvius (2017)					✓

The construct “Sustainable Project Delivery” is the only one that appears in all the identified models, corroborating the fact that they all seek to include sustainability issues in the project management process. None of the models referred to the construct “Sustainable Project Management

Methodology”, indicating that despite its existence and being referenced in the literature, it is not disseminated in the project management community. Gareis et al. (2010), was the only author who referred to the construct “Sustainable Development Goals”. Sarkis et al. (2012) and Martens and

Carvalho (2017), are the only authors who refer to the construct “Stakeholders Influence”, for Sarkis et al. (2012) this refers to subcontractors, whereas Martens and Carvalho (2017) refers to society, employees, suppliers and contractors. Krishnamurthy et al. (2014) and Svensson et al. (2016) are the only ones that refer to the construct “Companies using Sustainable Practices”.

As can be understood from the analysis in Table 4, the reference model presents its originality and differs from other models identified in the literature (Gareis et al., 2010; Silvius and Schipper, 2010; Sarkis et al., 2012; Silvius and Schipper, 2016; Tabassi et al., 2016; Martens and Carvalho, 2017; Carvalho and Rabechini, 2017; Krajangsri and Pongpeng, 2017; Banihashemi et al., 2017; Hosseini et al., 2018; Krishnamurthy et al., 2014; Zidane et al., 2015; Svensson et al., 2016; Rumaithi and Beheiry, 2016; Othman and Abdelwahab, 2018; Schipper and Silvius, 2017), as it lists the main latent and manifest variables that support and influence the incorporation of sustainability in project management. The manifest variables are indicators of how this integration can evolve and make the government, society, companies, professionals and other stakeholders more aware and engaged in achieving sustainable development, supporting the management and delivery of a sustainable project.

## 5. Conclusion

Despite having identified the existence of several models and different practices, a pattern or the existence of standards that are similar and present greater conformity to each other was not identified in the treatment of sustainability in project management. The work achieves its objective by confirming the reference theoretical model of project management is the one that considers sustainability in a comprehensive way, differing from the others for being the only

one that presents variables/constructs that influence and support the integration of Sustainability in Project Management.

For sustainable project management, companies must be concerned with effectively meeting the SDGs, including their incorporation into guides and best practices available in the market; as well as the effective influence of the different stakeholders of projects searching for their sustainability, creating an ecosystem where companies actually are and deliver sustainable projects. Sustainable project management will be essential so that, among other considerations, each new project seeks to reduce energy consumption, reuse water, reduce use and reuse resources and products. New products and/or services generated will need to be designed within the concept of a more circular economy.

From the analysis of the literature, it is inferred that the SDGs are not yet effectively disseminated at the level of models and companies, governments need to work more on public policies of incentives and regulations, to boost the acculturation and adaptation actions of companies towards sustainable development. It is necessary to include a discipline related to sustainability and sustainable project management in undergraduate and graduate courses to train professionals and managers who are aware of the importance of balancing the pillars of TBL in their companies' businesses and projects.

There is a need to disseminate sustainable project management methodologies so that they are adopted as a standard in project management. Priority and focus must be given to the inclusion/definition of sustainability as an area of knowledge in project management of project management standards to increase the influence on the community of project management professionals and give greater relevance to the theme.

For the training of project managers (Silvius, 2017; Global, 2019, GPM, 2020; IPMA, 2020), there are several trainings, and certifications provided by organizations such as GPM Global and IPMA, the methodologies taught in these are referenced in the literature and cover this training gap, as they include indications of how to address sustainability issues in a project, requiring that they be disseminated and referenced. This training will boost the dissemination of the adoption of sustainable project management methodologies as a standard in project management.

This study contributes to the evolution of scientific research in the area of sustainability and project management, presenting the models and frameworks

identified in the literature, indicating the one that contains the main variables that support and drive the incorporation of sustainability in project management. The study compared the convergence between the models identifying their alignment and increasing the reliability of the reference model.

A limitation of this research involves the use of content analysis and potential biases and personal limitations of researchers in their decisions and analyses, which may interfere with the research results. As future work, it is suggested that the reference model be also validated through a case study that could be carried out with a sample of three companies to verify the adequacy of the reference model.

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