KEYWORDS › Project management maturity › Sustainability › Green Project Management › Sustainable Project Management

DEVELOPING A MATURITY MODEL FOR ASSESSING SUSTAINABLE PROJECT MANAGEMENT

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ABSTRACT

Sustainability is one of the most important challenges of our time. Companies are integrating ideas of sustainability in their marketing, corporate communication, annual reports and in their actions. Projects play a pivotal role in the realization of more sustainable business practices, and a growing number of studies link the concept of sustainability to project management. However, sustainability is understood by instinct, but difficult to express in concrete, operational terms. The evolving concept of sustainable project management is also hard to operationalize. A condition for this operationalization is the availability of an instrument that can be used for the assessment and development of the integration of sustainability in projects and project management.
This paper develops the 'Sustainable Project Management Maturity Model' as a practical 'tool' for the assessment and development of the integration of sustainability in projects. With this maturity model, organizations can translate the abstract and interpretive concepts of sustainable development into practical actions in their projects and monitor their development.

INTRODUCTION

'Green' or 'sustainable' project management' is identified as one of the most important global project management trends today *(Alvarez-Dionisi et al., 2014)*. Silvius and Schipper *(2014)* identify a growing number of publications that link the concepts of sustainability to project management. So it may be concluded that this "most important leadership challenge facing business today", the integration of sustainability into core business functions *(BSR/GlobeScan, 2012)*, now also found its way to the project management domain. Silvius and Tharp *(2013)* therefore conclude that "the relationship between sustainability and project management is … picking up momentum" *(Silvius and Tharp, 2013: xix)*.

This growing attention for 'Sustainable project management', however, also bears some challenges. The concept of sustainability is understood by instinct, but difficult to express in concrete, operational terms *(Briassoulis, 2001)*. In an attempt to provide a practical tool for the development and integration of sustainability into project management, Silvius and Schipper *(2010)* developed a maturity model that addresses the consideration of sustainability aspects specifically to project management. And although this maturity model provided a useful assessment instrument that was applied in several studies *(For example Kluiwstra and Grevelman, 2010; Hulspas and Maliepaard, 2011; Silvius et al., 2013)*, its design is not oriented towards providing logical guidance on maturity development that is typical for organizational maturity models. The model of Silvius and Schipper *(2010)* therefore primary works as an assessment model, and not so much as a development model.

This paper builds upon the idea of this model, and the concept of organizational maturity models, in order to develop a maturity model that is suitable for both assessing and developing the organizational capability of integrating the concepts of sustainability in projects and project management.

The paper is organized as follows. In the next paragraph, the relationship between sustainability and project management will be established, and, drawing from literature, a definition of 'sustainable project management' will be found. The than following paragraph will explore the concept, design and development of organizational maturity models. The paragraph 'Developing the Sustainable Project Management Maturity Model' will report the scope, design and content of the developed model.

1. Sustainability in project management

The 'Brundtland report' of 1987 linked sustainability to change, by stating "In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" *(World Commission on Environment and Development, 1987)*. Change as an intervention to create a more desirable future. A frequently used practice of realizing change in organizations is by initiating and performing projects: temporary, task oriented organizations *(Lundin & Söderholm, 1995; Turner & Muller, 2003)*. The concept of sustainability has therefore also been linked to project management *(Gareis et al., 2009; Silvius et al., 2012)*. Association for Project Management *(past-)* chairman Tom Taylor recognizes that "the planet earth is in a perilous position with a range of fundamental sustainability threats" and "Project and Programme Managers are significantly placed to make contributions to Sustainable Management practices" *(Association for Project Management, 2006)*. And at the 22nd World Congress of the International Project Management Association *(IPMA)* in 2008, IPMA Vice-President Mary McKinlay stated in the opening keynote speech, "The further development of the project management profession requires project managers to take responsibility for sustainability" *(McKinlay 2008)*.

Also in academic research, the relationship between project management and sustainability is explored (e.g. *Labuschagne & Brent, 2005; Gareis et al., 2009; Silvius and Schipper, 2014*) as one of the (future) developments in project management. Alvarez-Dionisi et al. (2014) even identify sustainable, or 'Green', project management as the most important global project management trends today (*Alvarez-Dionisi et al., 2014*). Based on a structured analysis of 164 publications on sustainability in project management, Silvius and Schipper (*2014*) define 'Sustainable Project Management' as "the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economical 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 includes proactive stakeholder participation."

Silvius et al. *(2013)* observe that studies on the integration of the concepts of sustainability are mostly of an interpretive nature, giving meaning to how the concepts of sustainability could be interpreted in the context of projects *(for example Barnard et al, 2011; Maltzman and Shirley, 2010; Gareis et al., 2011, Oehlmann, 2011)*, or of a normative nature, prescribing how sustainability should be integrated into projects *(for example, Silvius et al., 2012; Labuschagne and Brent, 2006)*. Empirical studies, describing how the concepts of sustainability are integrated into projects, are limited. And the ones that were published *(For example Bell and Morse, 2003; Asad and Khalfan, 2007; Silvius and Nedeski, 2011; Goedknegt, 2012; Steele, 2013; Weninger et al., 2013)* typically cover one or multiple descriptive case studies.

Given the fact that the relationship between sustainability and project management is still an emerging field of study *(Gareis et al., 2009)*, these approaches make sense. However, Silvius et al. *(2013)*, also recognize the need for more generalizable, probably quantitative, empirical studies, in order to enable the progression of the integration of sustainability into project management.

A logical condition for more quantitative empirical studies is the availability of some kind of instrument that can be used for the assessment and development of the integration of sustainability in projects and project management. The definition of sustainable project management, mentioned earlier, is a conceptual starting point for the development of such an instrument, as it covers many aspects of sustainability that were found in studies on the integration of sustainability in project management (*Silvius and Schipper, 2014*). Another conceptual starting point for the development of an assessment instrument for sustainability in project management, is the concept of an (organizational) maturity model. Maturity models are suitable instruments to assess the implementation of complex concepts and to raise awareness for potential development (Dinsmore, 1998). They may also provide guidance for action plans and allow organizations to monitor their progress. The next paragraph therefore explores the concept, design and development of organizational maturity models.

2. Organizational maturity models

Defining maturity models

The Oxford English Dictionary defines maturity as "the state, fact, or period of being reached in the most advanced stage in a process". In the 1970's, publications such as Gibson and Nolan *(1974)* and Crosby *(1979)*, first applied the term maturity to indicate organizational capabilities. The popularity of the concept of organizational maturity was especially intensified by the introduction of the Capability Maturity Model *(CMM, later CMMi)*, in the late 1980's *(Paulk et al. 1993)*. Following the success of this model, a multiplicity of

different maturity models have been developed in science and practice *(Mettler, 2009)*. Kohlegger et al. *(2009)* identified 76 different organizational maturity models from domains within the spectrum of *(business)* information systems and computer science, thereby stating that "this list only provides the tip of an iceberg due to the fact that there are many more maturity models in other domains, e.g., biology , sociology or psychology *(Kohlegger et al., 2009: 51)*.

Despite of the widespread development and use of organizational maturity models in literature, a critical observation is that the nature of maturity models has not been theorised well *(Kohlegger et al., 2009)* and that "Maturity models…lack a clear definition and contextualisation." *(Mettler, 2009)*. Responding to this observation, Kohlegger et al. *(2009)* developed the following definition of a maturity model, based upon an analysis of a selection of maturity models: "*A maturity model conceptually represents phases of increasing quantitative or qualitative capability changes of a maturing element in order to assess its advances with respect to defined focus areas.*" *(Kohlegger et al., 2009: p59)*.

The maturing element of a maturity model may be a person, an object or a social system. In this last case, we can speak of organizational maturity models. In these models, maturity can be defined as "the optimized ability and capability of a system or an organization versus its intended goals, and it is a state in which an organization is in a perfect condition to pursue its objectives" *(Andersen and Jessen, 2003)*.

Design parameters of maturity models

Organizational maturity models can typically be characterized by their 'Levels', 'Domain', 'Dimensions', 'Respondents' and 'Nature' *(Batenburg et al., 2014)*.

'Levels' refer to the different maturity levels the model recognizes. With maturity models representing theories of stage-based evolution, their basic purpose consists in describing stages *(or levels)* and maturation paths *(Pöppelbuß and Röglinger, 2011)*. A model with only one maturity level should therefore not regarded be as a maturity model *(Batenburg et al., 2014)*. Following the CMM, most maturity models recognize four or five levels *(Pöppelbuß and Röglinger, 2011)*.

'Domain' refers to the field of interest that the model assesses to. This field of interest may be broad, resulting in an assessment of generic organizational capability, or focused, resulting in a model that assesses the specific organizational capability in the defined focus area *(van Steenbergen et al., 2010)*.

The field of interest logically forms the basis for the specification of 'Dimensions' or criteria with which the model structures the assessment of the field of interest. A dimension can be further specified by activities, common features and measures for each maturity level *(Batenburg et al., 2014)*.

'Respondents' refers to the target group of respondents for data collection *(e.g. management, staff, business partners or a combination)* with the maturity model *(Mettler, 2009)*.

The 'Nature' of a maturity model refers to the purposes of use of the model and typically distinguishes descriptive models, prescriptive models and comparative models *(Becker et al., 2009; de Bruin et al., 2005; Iversen et al., 1999; Maier et al., 2009; Batenburg et al., 2014)*.

A descriptive maturity model is used as a diagnostic tool *(Maier et al., 2009)*, where the current capabilities of the entity under investigation are assessed with respect to given criteria *(Becker et al. 2009)*. A descriptive model needs to propose measurement criteria for each maturity level *(Batenburg et al., 2014)*. A prescriptive model indicates how to identify desirable maturity levels and provides guidelines on improvement measures *(Becker et al., 2009)*. It includes everything of a descriptive model, but additionally suggests improvement measures and actions using good or best practices *(Lahrmann and Marx, 2010; Knackstedt et al., 2011)*. A comparative model must be applied in a wide range of organizations in order to attain sufficient data to enable valid comparison *(de Bruin et al., 2005)*.

The aspects 'Levels', 'Domain', 'Dimensions', 'Respondents' and 'Nature', as described above, together form a set of design parameters for the development of a maturity model.

A development framework for maturity models

De Bruin et al. *(2005)* describe a first design methodology for the development of a maturity model. Based upon their realization that "Whilst maturity models are high in number and broad in application, there is little documentation on how to develop a maturity model that is theoretically sound" *(De Bruin et al., 2005, p.2)*, they propose a phase-based development framework. **Figure 1** depicts this framework.

The framework is generic, however, the order of the different phases is important *(De Bruin et al., 2005)*. For example, decisions made when designing the model, will affect the way the model can be populated and tested.

3. Developing the sustainable project management maturity model

This section describes the first three phases of the development of the 'Sustainable Project Management Maturity Model' *(SPM3)*: scope, design and populate. The fourth phase *(testing)* is ongoing, whereas the fifth *(deploy)* and sixth phase *(maintain)* are planned for the future.

Domain

The most significant decision to be made in the scope phase of development, involves the domain or field of interest that the model focuses on *(De Bruin et al., 2005)*. As from our literature review on sustainability in project management showed that integration of the concepts of sustainability into the processes and practices of project management is a developing area, we scoped the SPM3 model to focus on this domain. This implies that the unit of analysis when applying the model is a project. Most questions may apply also to programs, however, the questionnaire is developed to be applied specifically to projects and to assess the integration of sustainability on the level of an individual project.

A question that arises when assessing the integration of sustainability in a project, is whether the process of realizing the project is assessed or the product/deliverable that the project creates. In other words are we assessing the sustainable management of projects or the management of sustainable projects? The maturity model proposed by Silvius and Schipper *(2010)* integrates the two perspectives in what is called the 'levels of consideration'. The model recognizes considering sustainability at the level of resources, processes, business model or products/services. This integrative approach of project process and project product, however, provides challenges. With this model, it is possible that a project is assessed as scoring high in considering sustainability on the level of the product/service, but low on the level of process. For example, a project of building a hydro-energy facility, so creating a very 'green' outcome, may be built with little consideration of the environment and some stakeholders in the project delivery and management process. A situation like this, a 'sustainable' project output realised with a not so sustainable project process can occur, however, the outcome of the maturity assessment will be inconsistent with the basic premise of a maturity model, that the maturity levels represent "phases of increasing quantitative or qualitative capability" *(Kohlegger et al., 2009: p59)*.

It is for this reason that in the design of the SPM3, we divide the domain 'project' into two sub-domains that will be independently assessed:

- Project process: Including the resources used in the project processes and the way the processes are organized and executed.
- Project product: The deliverables of the project and their effects on various stakeholders and society.

As part of the scope of a maturity model, De Bruin et al. *(2005)* suggest the selection of an appropriate development team. The SPM3 model was developed with a core team coming from academia and industry.

Levels of maturity

One of the decisions in the design of the maturity model is the number and nature of maturity stages or levels. Most maturity models follow the CMM in recognizing four or five levels *(Pöppelbuß and Röglinger, 2011)*. Additional to these four or five maturity stages, a model may have a 'non existing' stage *(Kohlegger et al., 2009)*. Many maturity models also follow CMM in expressing maturity in terms of the extent to which instances of a distinct process type are managed, documented, and performed *(de Bruin and Rosemann 2007)*. CMM includes five levels of process maturity ranging from a rather chaotic to a predictable and continuously improving process execution *(Paulk et al. 1993)*.

FIGURE 1. *A development framework for maturity models (De Bruin et al., 2005).*

The concept of maturity models has also been applied to the consideration of sustainability in businesses. Müller and Pfleger *(2014)* discuss seven different sustainability maturity models found in research and practice. **Table 1** summarizes these models.

The sustainability maturity models summarized by Müller and Pfleger *(2014)* (**Table 1**), basically apply a slight modification of the maturity levels of the CMM, to define a five-level maturity grid. In all models, level 1 indicates little understanding of sustainability and few or no related policies. Level 2 stands for a rudimentary level of maturity, at which companies begin considering sustainability aspects in corporate decision-making. This maturity level is reactive in the sense that only mandatory rules and laws are respected. At maturity level 3 the organization has developed more capabilities and skills on sustainability, and encourages individuals to contribute to sustainability programs. These programs show an elementary integration of sustainability aspects into corporate strategy, that exceeds compliance with rules and laws. Level 4 represents a satisfying and proactive consideration, often above the industry average, of specific sustainability aspect. On these aspects, sustainability is a core component of the business planning life cycles. Maturity level 5 represents a sophisticated level of consideration of sustainability, indicating that the organization does an outstanding effort. The organization employs sustainability practices across the entire enterprise and includes customers, suppliers, and partners. The industry recognizes the organization as a sustainability leader and uses its sustainability maturity practices to drive industry standards *(Baumgartner and Ebner 2010)*.

Notwithstanding using CMM-like maturity levels, the models of Cagnin et al. *(2011)*, Kirkwood et al. *(2008)*, Object Management Group *(2009)* and Silvius and Schipper *(2010)* describe

	Cagnin et al. (2011)	Kirkwood et al. (2008)	Zarnekow and Erek (2008)	Object Management Group (2009)	Silvius and Schipper (2010)	Mani et al. (2010)	Curry and Donnellan (2012)
Application area	Business	Supply networks (network design)	Information management	Business	Project management	Manufacturing	Information and communication technology
Maturity level 1	Ad hoc	Accidental/ initial	Ad hoc	Ad hoc	Not existing	Initial	Initial
Maturity level 2	Planned in isolation	Repeatable	Conscious	Defined, documented and architected	Resources	Repeatable	Basic
Maturity level 3	Managed with no integration	Defined	Established	Repeatable and governed	Business processes	Defined	Intermediate
Maturity level 4	Excellenceat corporate level	Managed	Quantitatively controlled	Optimized and extensible	Business model	Quantitatively managed	Advanced
Maturity level 5	High performance sustainability net	Mastered/optimized	Optimized	Demonstrable ROI of green initiatives	Products and services	Optimizing	Optimizing

TABLE 1. *An overview of sustainability maturity models (Müller and Pfleger, 2014).*

their maturity levels in terms that do not necessarily suggest process maturity. For example, Silvius and Schipper *(2010)*, explicitly state that "the process maturity approach does not adequately address the specific aspects and considerations of sustainability" in project management processes and practices. In their book 'Sustainability in Project Management' *(Silvius et al.,2012)*, refer to Willard *(2005)*, who describes five 'sustainability stages' a company can be in *(***Figure 2***)*. The stages move from reactive to proactive and describe to what extent a company is committed to sustainability principles. The first stage is when companies fail even to comply with prevailing regulations. They are opportunistic and not engaged with the concept of sustainability . When a company complies with all environmental and social regulations it moves up to stage 2, 'compliance'. In stage 3 'beyond compliance' a company starts to not only react on regulations, but it starts introducing sustainability activities. Yet, these activities are not concerted but are carried out in different departments. Companies who understand the importance of sustainability and the value-added they can gain from sustainable activities e.g. energy-efficient production or eco-friendly products and integrate sustainability into their corporate strategy are in stage 4 'integrated strategy'. The highest stage 5 'purpose and passion' is attained when companies are not just driven by profits but also by a sense of responsibility to improve society and environment and contribute to a better world.

The stages of sustainability model illustrates how companies can move from a reactive approach to a proactive one. The difference between the stages 3 and 4 is especially important here. This step distinguishes companies that try to 'do no harm', by trying to minimize the negative effects of their business, from companies that try to proactively 'make a positive contribution', by integrating sustainability considerations in their core business strategies.

A similar dichotomy can be found with Baumgartner and Ebner *(2010)*. In their study of the sustainability maturity of corporate strategies, they differentiate between introverted strategies and extroverted strategies.

Introverted strategies consider sustainability as an additional aspects of doing business and concentrate on a basic level of sustainability consideration such as conformity and compliance with sustainability-related rules and guidelines. These strategies could be characterized as 'risk avoidance' or 'defensive'.

Extroverted strategies consider sustainability as an integrated part of the business and perhaps even as the reason for doing business. Within the extroverted strategies, Baumgartner and Ebner *(2010)* distinguish a more conventional and a more transformative approach. In the conventional extroverted strategy, the organization uses its sustainability as a differentiator in the marketplace. Given the 'competitive edge' that these organizations experience from proactively considering sustainability in their business and activities, it makes sense to engage more in sustainability that it is obliged to do by laws and regulations. In these organizations, the marketing of their sustainability efforts plays an important role. Organizations that adopt a transformative extroverted strategy, go beyond the 'competitive edge' perspective on sustainability. For these organizations, their activities are a driver for sustainability in society. Sustainability is integrated in all aspects of business and strategy, and gains therefore much higher credibility.

For organizations that adopt extroverted sustainability strategies, it is, however, also necessary to assure a high maturity in internal sustainability policies and practices *(Baumgartner and Ebner, 2010)*. Making a positive contribution to society on certain aspects of sustainability, therefore also implies to do no harm to society on all aspects of sustainability. This hierarchy between the 'positive contribution' strategies and the 'do no harm' strategies makes it a suitable perspective for the recognition of maturity levels in the SPM3 model. And given the dichotomy between a 'do no harm' strategy and a 'positive contribution' strategy, we decided to not include a 'middle' maturity level in between these two strategies and to develop a four level maturity scale for the SPM3. These four maturity levels are described in **Table 2**.

Dimensions of sustainability

Another design decision in the development of the maturity model is that of the dimensions or criteria that, together, make up the understanding of the field of interest of the model: sustainability. Several organizations have developed frameworks of 'sustainable development indicators' *(SDIs)*, both as a way of measuring and evaluating *(proposed)* actions, and as a way of communicating

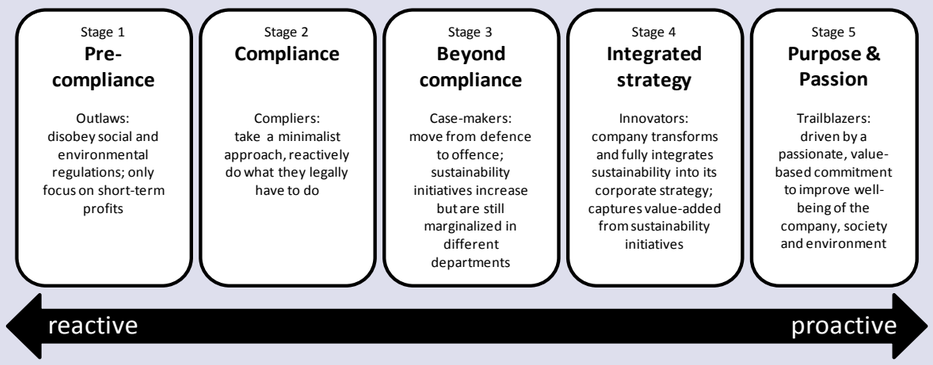

FIGURE 2. *The stages of sustainability. (Silvius et al., 2012, adapted from Willard, "The Next Sustainability Wave", 2005)*

Strategy	Maturity level	Description
'do no harm' ↑	Level 1: Compliant	(This aspect of) Sustainability is considered minimalistic and implicit, and (only) with the intention to comply with laws and regulations.
	Level 2: Reactive	(This aspect of) Sustainability is considered explicitly, with the intention to reduce negative impacts of the project.
	Level 3: Proactive	(This aspect of) Sustainability is explicitly considered as one of the areas that the project contributes to.
'positive contribution' ↓	Level 4: Purpose	Making a contribution to (this aspect of) sustainability is one of the drivers behind the project and sustainability considerations are included in the justification of the project.

TABLE 2. *The maturity levels of the SPM3 model.*

Indicator	Description	Specific variables
Return on Investment	Return on investment (ROI) refers to the creation and distribution of economic value as a basic indication of how the project creates wealth for all stakeholders. In determining the potential wealth of a project, we can distinguish by direct benefits for the investor/organisation (and Net Present Value as method to measure), indirect economic impacts (indirect benefits) as a result of the transaction of project and stakeholder and Life Cycle Costs which add the long term owning, using and disposal perspective to the potential wealth created by the project. Indirect impacts are an important aspect of an organization's role as a participant or agent in socio-economic change, particularly in developing economies. Indirect impacts are particularly important to assess and report in relation to local communities and regional economy. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011) and Gijzel (2014).**	- Direct financial benefits - Net Present Value / Value optimization - Life Cycle Cost - Significant indirect economic impact
Business Agility	The competence to be flexible or agile is an important economic value in modern society. Business agility refers to the extend in which this is possible in the project delivery, the deliverable and the business effects. Flexibility can be divided into flexibility of objects (material or non-material) and flexibility in decision making. Flexibility of objects is about the ability of the object to undergo functional adaptations in the future. Multi-functionality refers to the multiple use of processes, deliverables and products. Flexibility of decision making is about optionality: the possibility to postpone final decision and keep options open. **Sources: Baumgartner and Ebner (2010), Bell and Morse (2003), Knoepfel (2010), Fernández-Sánchez and Rodríguez-López (2010) and Gijzel (2014).**	- Flexibility of use (functional flexibility) - Multi-functionality - Optionality/ expandability - Increased business flexibility
Competitive potential	Competitive potential arises when an organization acquires or develops (through projects) an attribute or combination of attributes that allows it to outperform its competitors. Various aspects contribute to the development of the competitive potential of an organisation: • Innovation and new (information) technologies can provide competitive advantage, whether as a part of the product itself, as an advantage to the making of the product, or as a competitive aid in the business process • Sustainable leadership provides the visionary roadmap in coping with (future) resource scarcity, reputational aspects, the cost of externalities or to capitalize new market possibilities • Market presence relates to building community relationships, employee loyalty, and strengthening an organization's social license to operate. **Sources: Baumgartner and Ebner (2010), Bell and Morse (2003), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Oehlmann (2011) and Gijzel (2014).**	- Innovation and technology - Content leadership - Competitive advantage - Market presence
(Business) Continuity	Business continuity has a reactive meaning and a proactive meaning. Reactive business continuity is about ensuring that an organization's critical business functions will either continue to operate despite serious incidents during operations. Proactive business continuity is about change or adapting business functions and the business model of the organization, in case of changing circumstances or conditions. For example: finite resources, change in legislation, disruptive technologies and new disruptive business models from competitors. **Sources: Baumgartner and Ebner (2010), Bell and Morse (2003), Fernández-Sánchez and Rodríguez-López (2010) and Gijzel (2014).**	- Knowledge management - Organizational learning - Organisational reputation
Motivation and incentives	Motivation is the reasons for human actions, desires, and needs. It is the direction to human behaviour or what causes humans to want to repeat a behaviour and vice versa. Financial incentives can be one of the reasons for motivation where incentives can be either personal or organizational. Personal incentives should be motivational but responsible with respect to personnel and (local) community. Fair taxes are important organizational aspect. Tax should be fair to both the community and the organization. **Sources: Baumgartner and Ebner (2010) and Keeble et al., (2003).**	- Responsible incentives - Fair taxes / tax evasion
Risk reduction	Risk is the potential of losing something of (potential) value. Values can be gained or lost when taking risk resulting from a given action, activity and/or inaction, foreseen or unforeseen. **Sources: Keeble et al., (2003), Fernández-Sánchez and Rodríguez-López (2010) and Oehlmann (2011)**	- Risk reduction - Financial implications and other risks and opportunities of the organization's activities

TABLE 3. *Indicators of economic sustainability.*

this information *(Bell and Morse, 2003)*. In fact, the literature on these models is a veritable jungle of different approaches and numerous case studies *(Olsson et al, 2004)*. The International Institute for Sustainable Development *(IISD)* maintains an online directory of SDI frameworks, that includes more than 600 frameworks developed by governments, non-governmental organizations *(NGOs)* and individuals. However, only a limited number of these SDI frameworks are considered a de-facto international standard.

Amongst those that are, the most influential are the UN Global Compact framework, the ISO 26000 guideline on social responsibility, the GRI Sustainability Reporting Guidelines and the Dow Jones Sustainability Indexes.

The United Nations *(UN)* Global Compact *(2010)* is a framework of ten universally accepted principles, developed by the UN and a number of large corporations. It covers the areas of human rights, labour, environment and anti-corruption. Participating companies agree to comply with these principles. They can use the framework as a platform for disclosure. This initiative has been created because the UN realized that businesses are primary drivers for globalization and can help ensure long-term value creation that can bring benefit to economies and societies all over the globe. In the absence of global regulations, this voluntary code of conduct has been developed, hoping to stimulate companies to more sustainable business practices.

As a response to businesses' growing interest and the increasing number of sustainability-related institutions and frameworks, the International Organization for Standardization *(ISO)* launched ISO 26000 *(2010)*, a comprehensive guideline on social responsibility, to help companies introduce more sustainable practices. ISO 26000 is a guideline on social responsibility that is designed for all types of organizations. It summarizes seven social responsibility 'core subjects': Organizational governance, Human rights, Labour practices, The environment, Fair operating practices, Consumer issues and Community involvement and development. These core subjects are further broken down into 'issues', specific themes or activities a company should work on in order to contribute to sustainable development.

The Global Reporting Initiative *(GRI)* is a non-profit organization that pioneered the world's most widely used sustainability reporting framework, the Sustainability Reporting Guidelines *(SRG)*. Companies can use the SRG to indicate to shareholders and consumers their economic, social and environmental performance. GRI's objective is to facilitate sustainability reporting for companies and thereby stimulate them to operate more sustainably. The SRG framework, now in its fourth version *(G4)*, consists of an extensive set of indicators from which companies can select a set that is relevant to their operations or industry *(Global Reporting Initiative, 2013)*.

The Dow Jones Sustainability Indexes *(DJSI)* are not a reporting tool, but a family of indexes evaluating the sustainability performance of the largest 2,500 companies listed on the Dow Jones. They are the longest-running global sustainability benchmarks worldwide. The DJSI is based on an analysis of corporate economic, environmental and social performance, assessing issues such as corporate governance, risk management, branding, climate change mitigation, supply chain standards and labour practices. It includes general as well as industry specific sustainability criteria.

Next to these industry standards, academic publications also provide suggestions for sustainability indicators. For example, Baumgartner and Ebner *(2010)* identify 21 'aspects' of sustainability, grouped in the categories economic, environmental, internal social and external social sustainability.

The 2010 IPMA Expert Seminar 'Survival and Sustainability as Challenges for Projects' featured several papers and discussions on the integration of sustainability in projects and project management. The report of the seminar included a 'checklist' of sustainability aspects of projects, that was derived from the GRI G3 guidelines. The group of experts of this seminar mapped these aspects on project management processes, roles and responsibilities of project members and project management competencies *(Knoepfel 2010)*. More academic studies on indicators for sustainability in projects can be found in Bell and Morse *(2003)*, Keeble et al., *(2003)*, Labuschagne, and Brent *(2006)*, Fernández-Sánchez and Rodríguez-López *(2010)*, Oehlmann *(2011)*, Talbot and Venkataraman *(2011)* and Gijzel *(2014)*.

A shared element in these studies is that they organize their indicators of sustainability into the 'Triple Bottom line' *(Elkington, 1997)* classes of economical, social and environmental indicators.

Also several case studies from the practice of real-life projects provide an identification of indicators of sustainability specific to the context of these cases. For example, the organizations responsible for the development of the new Vienna hospital north, published a 'charter on sustainability', that presents 31 sustainability criteria that cover both the planning and construction phases of the hospital, as well as the 'manage and maintain' phase, when the hospital will be in operation and the building of the hospital itself *(Wiener Krankenanstaltenverbund and Stadt Wien, 2010)*. The charter provides a holistic perspective on the sustainability aspects, with indicators that are frequently used in construction projects, such as energy consumption, quality assurance, air quality and security, but also indicators that may be considered surprising and innovative, such as flexibility of use, absorbing vibrations, stakeholder participation, gender mainstreaming and systematic commissioning.

From this overview of SDI frameworks, studies and practices, it should be concluded that consensus on how to measure and assess sustainability has not emerged yet. A recurring structure in many frameworks is the triple bottom line concept mentioned earlier. However, some frameworks, for example ISO 26000, adopt a different structure and also different perspectives. Specialists actually question whether or not a common list is even possible, given the wide variety of conditions and the differences in values in different contexts *(Hardi and Zdan, 1997)*. In line with Mettler and Rohner *(2009)*, we therefore conclude that a maturity model on sustainability in projects and/or project management should be configurable to the characteristics and context of the project at hand.

Based on the overview of SDI frameworks, studies and practices, the SPM3 model adopted the structure of the triple bottom line classes of economical, social and environmental indicators. Tables 3, 4 and 5 present the population of the model

TABLE 4. *Indicators of environmental sustainability.*

Indicator	Description	Specific variables
Transport	Transport is about the movement of physical objects from one place to another. This is an important aspect of environmental sustainability because transport imposes environmental impacts of transporting products and other goods and materials for the projects operations, and transporting members of the workforce. **Sources: Global Reporting Initiative (2013), Knoepfel (2010), Keeble et al., (2003), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Impact of transporting materials, resources, workforce and products - Local procurement - Digital communication
Energy	Energy is the ability to do work and the source of operations. Energy is related to greenhouse gas (GHG) emissions and to scarcity of their origins (e.g oil). Therefore from an environmental perspective various aspects are important: • the use of fossil energy versus the use of renewable energy • the energy consumption within the project vs the energy consumption outside the project. Energy consumption has a direct effect on project costs and can increase exposure to fluctuations in energy supply and prices. The environmental footprint of an project (organization) is shaped in part by its choice of energy sources. Changes in the balance of these sources can indicate the project's efforts to minimize its environmental impacts. **Sources: Global Reporting Initiative (2013), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Talbot and Venkataraman (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Energy used in the project - Energy used in the value chain - Use of renewable energy
Water	Water is a transparent fluid which forms the world's streams, lakes, oceans and rain, and is the major constituent of the fluids of living things and is vital for all known forms of life. Approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. There is a clear correlation between access to safe water and gross domestic product per capita. Withdrawals from a water system can affect the environment by lowering the water table, reducing the volume of water available for use, or otherwise altering the ability of an ecosystem to perform its functions. Such changes have wider impacts on the quality of life in the area, including economic and social consequences. Therefore the effect of the project on water sources and the source of the water used (rain water, potable water) are important aspects to consider. **Sources: Global Reporting Initiative (2013), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Talbot and Venkataraman (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Use of potable water - Use of rain water
Eco system	An ecosystem is a community of living organisms (plants, animals and microbes) in conjunction with the non-living components of their environment (things like air, water and mineral soil), interacting as a system. Ecosystems provide a variety of goods (e.g. food, water, minerals, raw materials) and services (e.g. decompostation of waste, pest and disease control) upon which people depend. Two components of an ecosystem may be distinguished: the habitat (the natural environment in which an organism lives, or the physical environment that surrounds a species population) and the biodiversity (flora, fauna) within a habitat. Changes in biodiversity affects ecosystem function, as do the processes of disturbance and succession. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Bell and Morse (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011) and Gijzel (2014).**	- Bio diversity - Fauna diversity - Flora diversity - Habitats protected or restored
Waste and Packaging	Wastes are substances or objects, which are disposed of or are intended to be disposed or are required to be disposed of by the provisions of national law (basel convention). Packaging is the enclosing or protecting objects (products) for distribution, storage, sale, and use. Packaging often results in waste. The disposal of products and packaging materials at the end of a use phase is a steadily growing environmental challenge. Establishing effective recycling and reuse systems to close project and product cycles contributes significantly to increased material and resource efficiency. It also mitigates problems and costs related to disposal (of packaging). **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Keeble et al., (2003), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011) and Wiener Krankenanstaltenverbund and Stadt Wien (2010).**	- Recycling / disposal - Pollution - Hazardous waste - Packaging
Materials and resources	Material is a broad term for the substance, or a mixture of substances that constitute a thing. From environmental perspective some attributes of materials are important: • the extent to which materials used for the project are or become toxic during the project • the scarcity of the material. the extent to which fossil (or non-replaceable) materials are used by the project • the reusability of the material after their use • the origin of the material • the incorporated energy of the materials during sourcing or production or use by the project. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Toxic materials - Fossil or scarce materials - Reusability / renewability - Origin of materials and resources and their environmental impact - Incorporated energy in materials/resources
Emissions	During the production of materials, emissions such as greenhouse gasses (GHGs) are produced as side effect. GHG emissions are a major contributor to climate change. Some GHGs, including CO2methane (CH4), are also air pollutants that have significant adverse impacts on ecosystems, air quality, agriculture, and human and animal health. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Bell and Morse (2003), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Talbot and Venkataraman (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Emissions into air - Emissions into the soil - Emissions into water
Spatial planning	Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. Several aspects influence this: the use and quality of space, the social relevance and welfare related to the space, reachability, and investment climate to business and inhabitants. **Sources: Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Use and quality of space - Social relevance - Reachability / accessibility - Investment climate
Nuisance	Nuisance describes an activity or condition that is harmful or annoying to others (e.g., loud noises, vibrations, dust, dirt). Nuisance is relevant to project, while during execution nuisance levels of noise, vibrations, dust or dirt) commonly rise above aesthetic levels and can be annoying to the community. **Sources: Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Noise - Vibrations - Dust and dirt

Indicator	Description	Specific variables
Labor practices and decent work	Fair labour practices and decent work is the availability of employment in conditions of freedom, equity, human security and dignity. Various aspects are relevant address to this topic: • Employment: The number, age, gender, and region of new employee hires of the (project) organization can indicate the project/ organization's strategy and ability to attract diverse qualified employees. This can signify the organization's efforts to implement inclusive recruitment practices based on age and gender, and the optimal use of available labor and talent in different regions. • Labour/management relations: Minimum notice periods are an indicator of an organization's ability to maintain employee satisfaction and motivation while implementing significant changes to operations. This provides insight into an organization's practice of ensuring timely discussion of significant operational changes, and engaging with its employees and their representatives to negotiate and implement these changes (which may have positive or negative implications for workers). Consultative practices that result in good industrial relations help provide positive working environments, reduce turnover, and minimize operational disruptions. • Health and Safety: Health and safety performance is a key measure of an organization's duty of care. Low injury and absentee rates are generally linked to positive trends in staff morale and productivity. This Indicator shows whether health and safety management practices are resulting in fewer occupational health and safety incidents. • The level of diversity within an project provides insights into the human capital of the organization • Equality of remuneration is a factor in retaining qualified employees in the workforce. Where imbalances exist, an organization runs a risk to its reputation and legal challenges on the basis of discrimination. **Sources: Global Reporting Initiative (2013), Bell and Morse (2003), Knoepfel (2010), Keeble et al., (2003) and Labuschagne, and Brent (2006).**	- Employment - Labour / Management relations - Health and Safety - Diversity and equal opportunity - Equal remuneration - Supplier assessment
Human rights	Human rights covers the extent to which processes have been implemented, incidents of human rights violations, and changes in stakeholders' ability to enjoy and exercise their human rights. Among the human rights issues included are non-discrimination, gender equality, freedom of association, collective bargaining, child labour, forced or compulsory labour, and indigenous rights. There is growing global consensus that organizations (and projects) have the responsibility to respect human rights. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Non-discrimination - Freedom of association - Child labour - Forced and compulsory labour - Disciplinary or security practices - Gender neutrality
Ethical behaviour	Ethical behavior, consisting of anti-competitive behaviour, anti-trust, and monopoly practices must ensure a level playing field for customers (and supplier) regarding: consumer choice, pricing, and other factors that are essential to efficient markets. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Knoepfel (2010), Labuschagne, and Brent (2006), Oehlmann (2011) and Gijzel (2014).**	- Investment and procurement practices - Bribery and corruption - Anti-competition behaviour
Society, customer and product responsibility	Society, customer and product responsibility concerns with impacts caused by project activities, project results and their effects on customers, society, local communities and other stakeholders. Important aspects are: • Direct customer impacts: customer health and safety, customer privacy and aesthetic and experiental sustainability (the activities or deliverable should communicate a level of sustainability from an aesthetic and experiential perspective and call attention to sustainable solutions. • Influence of the customers through products and services labelling and market communication and advertising • Support to the community • Compliance with law. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Knoepfel (2010), Keeble et al., (2003), Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011) and Wiener Krankenanstaltenverbund and Stadt Wien (2010).**	- Community support - Customer health and safety - Products and services labelling - Market communication and Advertising - Customer privacy - Compliance
Participation	Participation is about the involvement of stakeholders, suppliers and customers with respect to the sustainability aspects of project's and their results. Participation is distinguished by different aspects: • Proactive stakeholder engagement: managing the project for stakeholders instead of managing the stakeholders • Involvement (coordination, collaboration and integration) of the participants in the supply chain to address sustainability issues in the design of products, production and delivery of products. • Assessment of suppliers regarding the economical, environmental and social aspects of their business **Sources: Labuschagne, and Brent (2006), Fernández-Sánchez and Rodríguez-López (2010), Oehlmann (2011), Talbot and Venkataraman (2011), Wiener Krankenanstaltenverbund and Stadt Wien (2010) and Gijzel (2014).**	- Proactive stakeholder engagement - Coordination, collaboration and integration in the supply chain
Human capital development	Human capital refers to the collective (economic) value of the organization's intellectual capital (competencies, knowledge, and skills). This capital is the organization's constantly renewable source of creativity and innovativeness (and imparts it the ability to change) to meet strategic targets in a changing work environment. A more skilled and aware workforce enhances the organization's human capital and contributes to employee which correlates strongly with improved performance. It can be developed through education, training and enhanced benefits that will lead to an improvement in the quality and level of production. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010) and Keeble et al., (2003).**	- Training and learning
Corporate governance	Governance broadly refers to the mechanisms, processes and relations by which corporations and projects are controlled and directed. Sustainability aspects should be covered and integrated in the areas of documentation, reporting and decision making and strategy formulation. **Sources: Global Reporting Initiative (2013), Baumgartner and Ebner (2010), Keeble et al., (2003) and Fernández-Sánchez and Rodríguez-López (2010).**	- Sustainability reporting - Transparency - Accountability

TABLE 5. *Indicators of social sustainability.*

with the description of variables and indicators.

Respondents

In the selection of respondents for the sustainability assessment of a project with the SPM3 model, the most important criterion is that the respondents possess enough insight into the project to adequately answer the questions. From the experiences with the maturity model as proposed by Silvius and Schipper *(2010)*, the 'minimal set' of respondents for the maturity assessments is the project's project manager and the project sponsor. However, it is strongly encouraged that more stakeholders, both internal to the project and external, participate in the maturity assessment, so that also their perspectives are considered.

The assessments can be done by the respondents themselves *(self-assessment)* or by an independent assessor. Project documentation can be used to validate or substantiate answers given by the respondents.

Nature of the model

As most maturity models, the SPM3 model is designed as a descriptive model, with which organizations can assess their level of integration of sustainability in a specific projects. However, with the description of the different maturity levels and the list of sustainability indicators, the SPM3 model also provides extensive guidelines on how to develop the integration of sustainability in projects. In this aspect, the model also intentionally bears the characteristics of a prescriptive model.

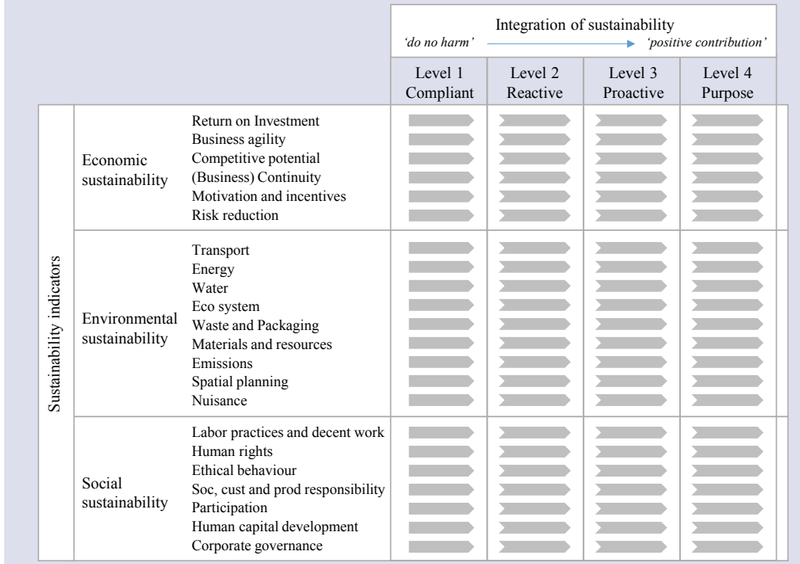

FIGURE 3. *Conceptual framework of the SPM3 model*

The prescriptive use of the model is further developed by assessing the integration of the individual sustainability indicators twice. Once as assessment of the 'actual' situation of the project, and once as assessment of the 'desired' situation of the project. The difference between the 'actual' and 'desired' maturity level logically indicates a required improvement.

4. The SPM3 model

Conceptual framework

The SPM3 model assesses the level *(compliant, reactive, proactive or purpose)* on which the different indicators of sustainability are integrated in the project.

Figure 3 shows the conceptual framework of the SPM3 model.

As described earlier, the assessment is done separately for the project process and project product. The report of the project assessment therefore includes twice the framework as a visualized reporting framework: the first one for the integration of sustainability in the project process and the second one for the integration of sustainability in the project product.

The assessment scores on the individual sustainability indicators may be condensed to single scores for 'economic sustainability', 'environmental sustainability' and 'social sustainability', or even one overall score indicating the 'total' integration of sustainability. And although these condensed scores are interesting for a more comparative use of the model, the nature of the projects assessed may be

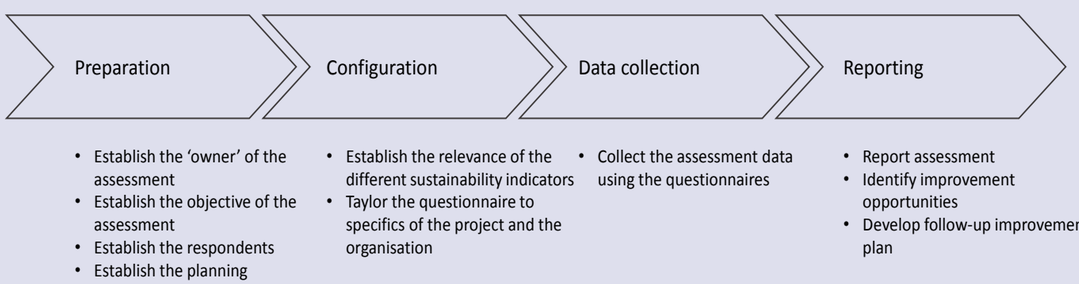

FIGURE 4. *Process model of the SPM3 assessment.*

quite different, which would affect the validity and relevance of the comparison.

Questionnaire

The SPM3 maturity assessment uses a questionnaire consisting of five sections. The first three sections cover descriptive questions regarding the respondent, the project that is assessed and the organizational context of the project. The fourth section consist of the actual assessment questions for the assessment of the project process. The fifth section is similar to the fourth section, but assesses the project product.

For each sustainability indicator, 22 in total, an assessment of the current situation and the desired situation is asked. The answer categories correspond the four levels of maturity. Some example questions[1]:

[Assessing the sustainability criterion ethical behaviour in the project process.]
How is attention for ethical behaviour, for example preventing bribery, anti-competitive behaviour, anti-trust, and monopoly practices, integrated in the project resources, processes and the way the processes are organized and executed?

	Actual situation	Desired situation	
1.	[ ]	[ ]	This aspect is considered implicitly, in compliance with laws and (company) regulations. No specific policies are applied in the project.
2.	[ ]	[ ]	This aspect is considered explicitly, but reactively, and with the intention to not compromise the interests of different stakeholders of the project.
3.	[ ]	[ ]	This aspect explicitly considered as one of the areas that the project contributes to.
4.	[ ]	[ ]	Making a contribution to this aspect is one of the drivers behind the project and included in the justification of the project.

[Assessing the sustainability criterion waste in the project product.]
How are creating (hazardous) waste, pollution, packaging, recycling and disposal of waste considered in the deliverables of the project and their effects on various stakeholders and society?

	Actual situation	Desired situation	
1.	[ ]	[ ]	This aspect is considered implicitly, in compliance with laws and (company) regulations. No specific policies are applied in the project.
2.	[ ]	[ ]	This aspect is considered explicitly, but reactively, and with the intention to not compromise the interests of different stakeholders of the project.
3.	[ ]	[ ]	This aspect explicitly considered as one of the areas that the project contributes to.
4.	[ ]	[ ]	Making a contribution to this aspect is one of the drivers behind the project and included in the justification of the project.

Applying SPM3

An assessment of a project with the SPM3 model follows a typical step-by-step process as is indicated in **Figure 4**.

The process model of the SPM3 assessment adds to the logical process steps of 'Preparation', 'Data collection' and 'Reporting', the step 'Configuration'. As stated earlier, on this the SPM3 model follows Mettler and Rohner *(2009)*, that concluded that maturity models should be configurable because of internal and external characteristics. A standardized maturity model may constrain the model's applicability *(Iversen et al. 1999)*. In 'Confuguration', the specific variables for each sustainability indicator, as presented in **tables 3, 4** and **5**, are determined and the relevance of the indicator for the project at hand it set.

Reporting

The outcome of the assessment is reported in a graphical way *(***figure 5***)*, showing both the actual levels and the desired levels of integration of the sustainability aspects. Graphical reporting enhances the understanding of the improvement potential and facilitates the discussion on the follow-up improvement actions. Based on the differences between the actual and the desired levels, organizations can discuss their improvement actions, develop an action plan to bridge the gap between actual levels of maturity and desired levels and monitor their progress.

5. Conclusion

Projects can make a contribution to the sustainable development of organizations and society and 'green' or 'sustainable' project management is identified as one of the most important global project management trends today. However, as the concept of sustainability is understood by instinct, but difficult to express in concrete, operational terms, the need for some kind of instrument that can be used for the assessment and development of the integration of sustainability in projects and project management becomes apparent.

This paper presented a descriptive and prescriptive maturity model for the assessment of the integration of the concepts of sustainability in projects and project management. As organisational maturity models are suitable instruments to assess the implementation of complex concepts and to provide guidance on the development of improvement actions, they provide a good conceptual starting point for the development of a 'sustainable project management maturity model' *(SPM3)*.

The development of the SPM3 model followed the framework for the development of maturity models as found in literature. The design of the model took into account the various publications and standards on indicators of sustainability. In the application of the model, however, the specific variables used in the assessment of the indicators may be tailored to the specifics of the project or organisation at hand. SPM3 recognizes four maturity levels, that reflect the various models on the integration of sustainability in business strategies and practices from a reactive 'do no harm' strategy to a proactive 'positive contribution' strategy.

We may therefore conclude that the SPM3 model provides a practical and academically underpinned tool for the integration of the concepts of sustainability into projects and project management.

Further research on the topic of sustainable project management maturity will include the testing of the model on a limited number of real-life projects, and the deployment of the model in quantitative empirical studies.

1 The full questionnaire can be requested from the authors.

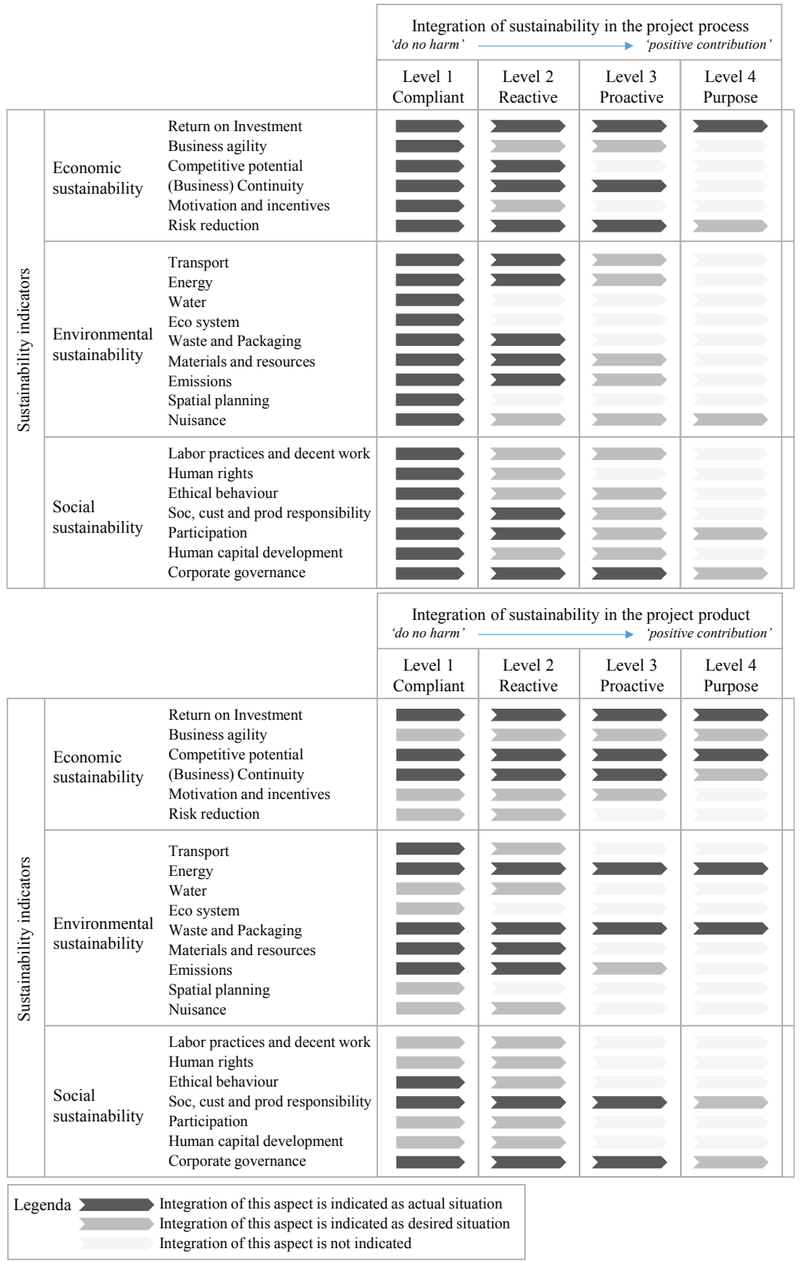

FIGURE 5. *Reporting format of the SPM3 maturity assessment.*

references Can be seen online at **www.journalmodernpm.com/public/issue07/References02.html**

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