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25 years of 'sustainable projects'. What we know and what the literature says

Abstract

Last few years have seen a huge increase of publications at the intersection of project management and sustainability. Nevertheless, this field has become increasingly fragmented undermining a steady and consistent development. Aiming at balancing tensions between authors' attempts for more 'integration' and the trajectories toward 'fragmentation, we employed an extensive, systematic literature review of 770 publications from the period 1993 to 2017. Therefore, this review offers guidance to scholars less familiar with this concept who encounter SPM in their research.

We suggest that the SPM literature can be understood by answering the following questions: (1) Why adopt sustainable business practices into projects? (2) What is the impact of sustainability on traditional project management practices? And (3) how is sustainability embedded in project practices?

The three narrative themes illustrate the diverse views on the different aspects of SPM, allowing divergences, such as different philosophical underpinnings or levels of analysis, to flourish without eroding the clarity of the field.

Introduction

Looking at policy makers' agendas, strategic investment decisions within large corporations or professional codes of ethics, it is impossible not to notice a growing attention for the concept of 'sustainability'. In the words of Gladwin et al. (1995) the transformation of "management theory and practice so that they positively contribute to sustainable development is […] the greatest challenge facing the Academy of Management" (p. 900). In parallel with this, the identification of a trend towards the 'projectification' of society society (Case and Piñeiro, 2009; Cicmil and Hodgson, 2006; Ekstedt, 2009; Lundin and Midler, 1998; Lundin and Söderholm, 1998), whereby economic activity is increasingly driven through projects, has drawn attention to (and consequently developed) the discipline of project management (PM). In this context, it is not surprising that PM is becoming increasingly important vehicle for implementing sustainability (Kivilä et al., 2017).

Yet, the integration of project management and sustainability is not a straightforward process: "integrating sustainability requires a scope shift in the management of projects; from managing time, budget and quality, to managing social, environmental and economic impact" (Silvius and Schipper, 2014a, p. 78). This is particularly so given the entirely different time horizons of these activities (Hope, 2012; Moehler et al., 2018). Whilst PM is necessarily focused on precise objectives and time-bound activities, sustainability is concerned with long-term challenges for which there is often no clear solution. The difficulty of addressing these "diverging but interconnected concerns" (Hahn et al., 2014, p. 463), and incorporating them into business logics, appears evident from an analysis of the literature.

As such a growing literature has begun to explore the intersection between sustainability and PM (that we will call sustainable project management or SPM). A recent review (Silvius and Schipper, 2014a) has attempted to unify this literature under a shared definition. However, since their review we have observed a substantial increase in the body of academic and

practitioner literature which makes their original review increasingly obsolete, where 73% of academic articles in this area have been published in the last 4 years. Despite Silvius and Schipper's (2014a) attempt at integration, there has been an increasing fragmentation within this discipline so that the current literature is characterized by inconsistencies, different research questions (Brones et al., 2014), philosophical underpinnings (Cicmil and Hodgson, 2006; Hodgson and Cicmil, 2016), levels of analysis (Agarchand and Laishram, 2017; Banihashemi et al., 2017; Carvalho and Rabechini, 2017; Gaziulusoy and Ryan, 2017; Hueskes et al., 2017; Kivilä et al., 2017; Marcelino-Sádaba et al., 2015; Martens and Carvalho, 2017; Sánchez, 2015), competing organizing frameworks (Abidin and Pasquire, 2007; Brook and Pagnanelli, 2014; Talbot and Venkataraman, 2011), and diverse understandings of sustainability and its determinants (Moehler et al., 2018; Vos, 2007).

Another source of field fragmentation, where "the topic still caused confusion about what should be studied" (Huemann and Silvius, 2017, p. 1068) is the distinction between sustainability 'by the project' and 'of the project' captured in a IJPM editorial by Huemann and Silvius (2017).

Moreover, research has been increasingly articulated along multiple levels of analysis. Thus some have focused at the micro-level (individual and professional project manager sphere – Gaziulusoy and Ryan, 2017; Goedknegt, 2012; Martens and Carvalho, 2017), others at the project level (Banihashemi et al., 2017; Carvalho and Rabechini, 2017; Fernández-Sánchez and Rodríguez-López, 2010; Kivilä et al., 2017; Sánchez, 2015), whilst others still at the macro-level (entire project governance and its surrounding environment – Agarchand and Laishram, 2017; Hueskes et al., 2017; Marcelino-Sádaba et al., 2015). Furthermore, research has also begun to take seriously the idiosyncrasies of different projects and project settings. As such researchers have begun to focus on distinct sectors such as services sector (Labuschagne et al., 2005) or construction projects (Brent and Labuschagne, 2006; Shen et al., 2010; Zuo and

Potangaroa, 2009), and other types infrastructures e.g. megaprojects (Fourie and Brent, 2006; Hueskes et al., 2017; Yuan, 2017). These coexisting steams increasingly pose different questions, employ different methodologies and adopt different levels of analysis as well as understandings of sustainability. In short the SPM field is much more complex and fragmented than when originally reviewed by Silvius and Schipper, 2014a.

This increasing fragmentation may act as 'unproductive confusion of tongues' (Bakker et al., 2005) which as recognised in the literature fails "to deliver clear and consistent findings, coherent advice to managers, and convincing 'best practice' solutions" (Keupp et al., 2012, p. 368). Alternatively fragmentation may play a more positive role in the development of a discipline since a lack of pluralism may unnecessarily narrow down the breadth of the field (Knudsen, 2003). Therefore it is important for the development of a discipline to balance the tension between the different requirement for 'integration' and 'fragmentation' (Bakker et al., 2005).

In this systematic review, following a grounded approach, and with the aid of a word tree model, we develop a schema that divides the SPM literature into three narrative themes that reflect their underlying common questions, themes or foci of contributions. We suggest that SPM can be understood and studied by considering the following questions: (1) why adopt sustainable business practices into projects? (2) What is the impact of sustainability on traditional project management practices? And (3) how is sustainability embedded in project practices? In doing so, the contribution of this review is the ability to balance the tension between integration vs fragmentation. The three narrative themes illustrate the diverse views on the different aspects of SPM, and facilitate comprehension of this literature for scholars who are less familiar with the field.

The remainder of the paper is structured as follows. First we discuss the concept of sustainable project management. Next, we outline our literature review methodology and provide both a

descriptive and thematic analysis of this literature. We then present the results of the word tree model and discuss the emergent themes through examples of how they are reflected in the literature. Our concluding sections highlight key issues arising from our analysis and provide some suggestions for future research directions.

Sustainable Project Management

In the field of general management, 'sustainability' is usually referred to the different approaches that management can have in dealing with social, environmental, and economic problems (Whiteman et al., 2013). Whilst economists define the related concept of 'sustainable development' on the basis of the formal definition provided by the Bruntland report in 1987[1], we don't have the same level of concept clarity within management. Sustainability is connected with many (often contrasting) objectives and complex interdependencies between the different actors at different social levels (from single individuals to the entire societies). For instance, "biodiversity might conflict with a specific goal to increase crop production by introducing a mono-cultural agriculture" (DesJardins, 2016, p. 128). For this reason sustainability definitions in management vary. However according to Vos (2007) they all tend to share same basic elements by: (1) considering environmental problems in relation to the economy and society; (2) focusing on intergenerational equity; and (3) emphasizing working beyond mere compliance with existing laws and regulations. Nevertheless, "beyond these elements, there is less agreement as to what belongs in definitions of sustainability" (Vos, 2007, p. 335).

Consequently similar problems affect understandings of SPM, whereas concepts like 'project', and 'project management' (e.g. PMBOK, 1996) are clear widely understood both in theory and practice, definitions of SPM are much more 'in development' (Moehler et al., 2018). Indeed, existing SPM definitions seem to reproduce with different degrees of attention the

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[1] "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Bruntland, 1987).

environmental issues, *intergenerational equity*, and *compliance beyond regulations* highlighted by Vos (2007). Thus, some of the most used definitions of SPM focus on minimizing resource usage (Deland, 2009)[2], account for project externalities (Tam, 2010)[3], emphasise protection of human and natural resources (Hope, 2012)[4], or provide a specific focus on construction projects (Ning et al., 2009)[5].

The difficulty in pinning down a shared definition is probably connected with the very multidisciplinary and multilevel nature of PM. Indeed, this discipline embodies both the traits of a basic research (developing new knowledge) and applied research (answering a question to a real world problem). This consideration is necessary to understand how research on SPM relates to the intrinsic PM processes (basic research – generate new knowledge) and the final artefacts of projects (applied research – provide a practical solution to a sustainability problem). Only recently the literature has started to highlight the fundamental dichotomy that exists in SPM between the "sustainability by the project and sustainability of the project" (Huemann and Silvius, 2017, p. 1066). A project can adopt sustainable metrics in its PM phases and procedures, regardless of what is the final object of the project (e.g.: an infrastructure project which considers in its processes some measures to reduce disruption to local communities and the environment around the construction site), and/or it can aim at delivering something sustainable, regardless of the way it deploys PM processes (e.g.: a solar power plant using a hazardous chemical component without an appropriate waste management system).

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[2] "What is SPM? It is minimizing the resources that you and your team use to work a project from project initiation through close" (Deland, 2009).

[3] "SPM is the promoting of positive and minimising of negative sustainability impacts […] within the process by which projects are defined, planned, monitored, controlled and delivered" (Tam, 2010).

[4] "An endeavor undertaken to achieve a desired transient outcome whilst protecting, sustaining and enhancing the human and natural resources required for future generations to meet their needs" (Hope, 2012).

[5] "SPM aims to apply the principle of meeting the needs of the day without compromising the benefits of future generations, to the construction industry by providing ways of buildings that use less virgin material and less energy, cause less pollution and less waste but still provide the benefits that construction projects have brought us throughout history" (Ning et al., 2009).

In the light of these considerations we decided to use the definition of SPM provided by Silvius & Schipper (2014a), which accounts for both these aspects:

> "Sustainable Project Management is 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 realising benefits for stakeholders, and performed in a transparent, fair and ethical way that includes proactive stakeholder participation" (Silvius and Schipper, 2014a, p. 79).

In structuring our review of the SPM literature, we therefore include, as detailed in Table 1, texts that consider projects that deliver a sustainable good or service and texts that consider projects that are delivered following sustainable processes.

Table 1: *Structure of the literature review.*

	Main distinction (1st level)	Type of contributions (2nd level)
Sustainable Project Management literature	Project *delivers* a sustainable good or service "sustainability by the project" (Huemann and Silvius, 2017, p. 1066)	Works that consider projects as tools to implement any sustainable solution. Focus: delivery of the sustainable solution.
	Project is *delivered* following sustainable processes. "sustainability of the project" (Huemann and Silvius, 2017, p. 1066)	Works that describe and analyse the value SPM brings for organizations or society. Focus: establishing benefits of SPM.
		Works that examine to what extent PM has been affected by sustainability. Focus: evaluation and integration of sustainability in PM tools and techniques.
		Works that describe and understand determinants for correct practical SPM implementation. Focus: make practical contributions for practitioners

The first category includes projects delivering things such as: wind turbines, solar power plants, energy efficiency buildings, waste reduction systems, whilst the second category includes those considering sustainability within project management processes regardless of the product or service being delivered.

Methodology

To perform the search we used the following keywords: 'sustainable', or 'sustainability', or 'sustainable development' in conjunction with 'project' or 'project management' (from 1993

to 2017). The incorporation of the search term 'sustainability' effectively expands the scope of the search used by Silvius and Schipper, although the most significant extension is the incorporation of an additional four years from 2014 to 2017 inclusive, period of rapid growth in the body of literature (Figure 1).

To assemble the dataset, we used Google Scholar[6] as the search engine we listed different works according to different source types: books, book chapters, journal articles, proceedings and conference papers, white papers (non-peer reviewed papers from PM professional associations), and other articles (made up of any relevant article that could not be included into previous categories, such as Ph.D. theses and other University publications, such as working papers or reports). For data extraction, Science Direct, Business Source Premier, Ebsco-Host and JSTOR databases were used to retrieve the full text of these publications for analysis.

Table 2: New items added updating time span (to 2017) and extending the keywords to include "sustainability"

Search keywords in title	No. of items	Time span
"sustainable" + "project"	593	2014 - 2017
"sustainable development" + "project"	143	2014 - 2017
"sustainable" + "project management"	69	2014 - 2017
"sustainable development" + "project management"	16	2014 - 2017
"sustainability" + "project"	1318	any time
"sustainability" + "project management"	120	any time
Total new items	2259	

Our searches found 2423 items (Table 2). Since research parameters were very wide we need to remove, from this dataset many duplicates, publications without text or not in English, and items not fitting in the scope of this review. The resultant dataset comprise 770 items, including: books (35), book chapters (73), journal articles (296), proceeding and conference papers (185), other articles (161), and white papers (20). The sample is presented in the following Figure 1.

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[6] Despite the fact that some authors (e.g. Giustini & Boulos, 2013) do not agree with using Google Scholar as a tool for systematic reviews, others (e.g. Harzing, 2014; Jean-François et al., 2013) demonstrate how its stability and coverage over time has improved considerably, specifically in a social science context (Harzing, 2013).
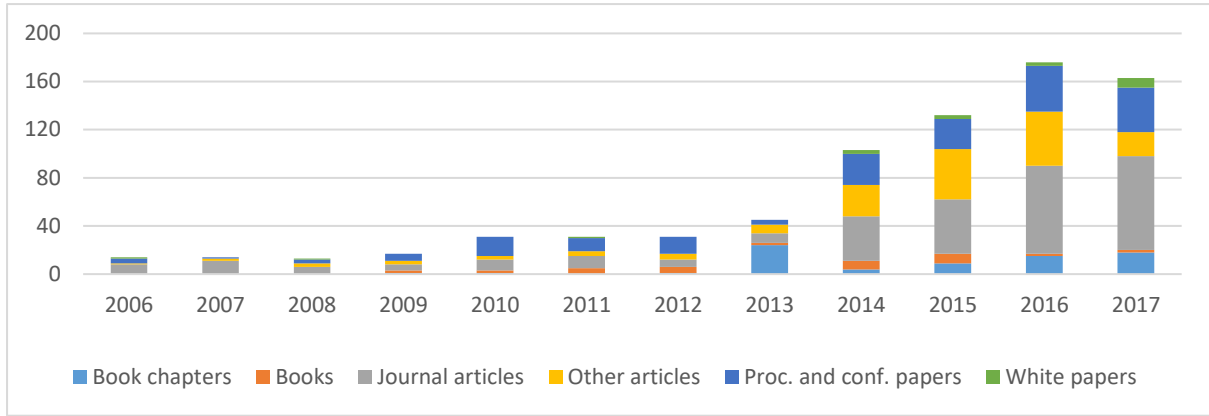
On this dataset we performed (1) descriptive analysis, (2) thematic analysis, (3) word tree model and (4) descriptive general discussion; as described in Table 3.

Table 3: Number of used items according to each analysis

	Analysis		items
1.	Descriptive		770
2.	Thematic	Context	584
		Methodology	426
3.	Word tree model		770
4.	Descriptive general discussion		44

First, the *descriptive analysis* investigates authors and their nationalities, journals of publication, the yearly development of publications and research fields and keywords. To do so we used the entire database (770 items). Second, since not all publication have a clear research context nor a methodology, *thematic analysis* could be performed only on a selection of the entire database (i.e.: 584 items to analyse the context of research and 426 to analyse the methodology). Third, we adopted on the entire dataset a *word tree model* (which depicts and summarizes multiple parallel sequences of words and their frequencies) created through NVIVO11 software to allow the underlying narratives to be determined by the data itself. We selected the word 'sustainability' and looked at verbs more frequently preceding or following it. Starting with words frequently associated with 'sustainability' (i.e.: get, achieve, assess, define, describe, improve, integrate, implement), we identified sub-groups with semantic

similarities (i.e.: get-achieve-assess, define-describe, improve-integrate-implement)[7], represented in Figure 2. By focusing on the meaning embodied in these semantic sub-groups we then developed the narrative themes explained in the fourth step.
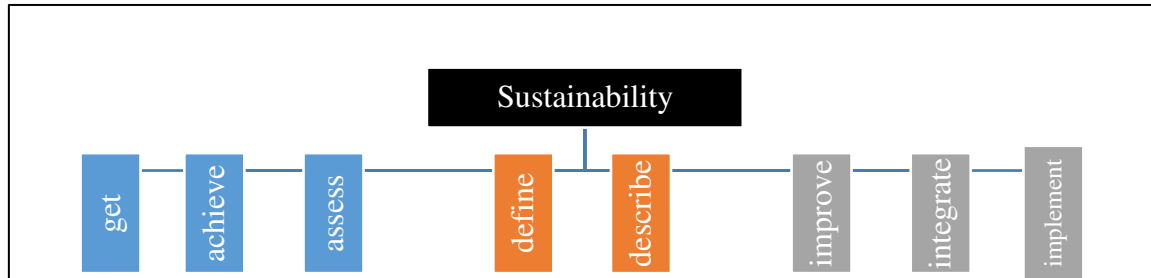

Figure 2: *Frequently associated words grouped by semantic similarities in the word tree model (NVIVO11)*

Fourth, *descriptive general discussion* is conducted only on journal articles in a grounded style, with no *ex-ante* assumptions. As our interest lies in the direction of development of the SPM field and not the specific content of individual papers, we use this section to provide examples of contributions to each narrative theme. Therefore, we undertook a detailed reading only of academic papers to provide exemplifications of the themes emerging from the NVIVO11 word tree model, and given the need for a detailed consideration of the content of the articles, we had to be selective. To select the most relevant papers, and discuss their contributions to the emerging narrative themes, we chose papers from journals publishing the majority of academic research on PM and, by implication, where we would expect to see the current debates around SPM developing[8]. These journals were: International Journal of Project Management (IJPM), Project Management Journal (PMJ), International Journal of Managing Projects in Business (IJMPB), and Journal of Cleaner Production (JCLP). In this way, our approach is similar to that of that of Aarseth et al. (2017), Silvius (2017), and Marcelino-Sádaba et al. (2015);

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[7] Highlighting the recurring terms associated with sustainability helped in recognizing the emergence of 3 broad categories of studies with 3 different underpinning logics.
[8] By the same token, we do not expect to see these debates advanced significantly through isolated papers published in more general management journals.

however, in order to capture a practitioner viewpoint on these debates as well, we also included a non-academic journal, PM World Journal[9], issued by the PMI. We also complemented this list with some of the most highly cited papers published elsewhere, but clearly contributing to the debate (see appendix 1 for a more details). The result is a list of 44 which provide a qualitative general discussion of the underlying emerging narratives identified. In this discussion we highlight examples of PM papers displaying one or more of the three emerging narratives. These narratives and their underpinning logics are subsequently explained in the 'descriptive general discussion' section.

Descriptive analysis

The descriptive analysis considers the investigating authors and their nationalities, journals of publication, and the yearly development of publications and research fields. The findings reveal the rapid growth rate of publications in recent years (Figure 1), which indicates the rising attention from both academic and non-academic researchers, with almost 80% of the identified literature published in the last five years[10]. In terms of nationality of author, it is possible to recognise contributions from a wide spread of different countries. Figure 3 and Table 4 show a European dominance to the pattern[11], but contributions emanate from most parts of the globe, which is to be expected given the global nature of the issue of sustainability.

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[9] Project Management World Journal was included to consider the perspective of PM professional associations.
[10] In 2017 numbers are a bit smaller, but this could be explained by the fact that the data collection has been performed in early January 2018.
[11] Bearing in mind, of course, that our search has been limited to English language publications, which could understate contributions from some places.
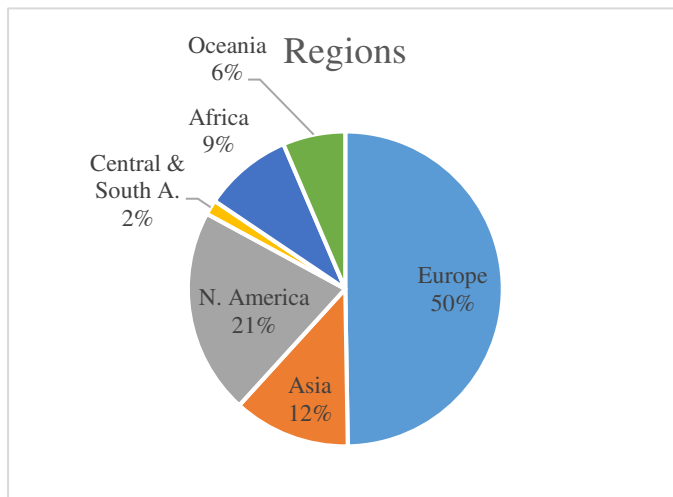
Figure 3: Publications per region

Country	Publications
USA	110
Netherlands	65
United Kingdom	41
China	37
Australia	35
South Africa	33
Italy	31
Sweden	29
Germany	28
France	24

Looking at another descriptive metric, journal title suggests a certain degree of dispersion. Looking only at the academic journal articles, no particular journal appears directly associated with a predominant position for publishing material about SPM. The most popular journals are listed in Table 5. Moreover, the top five most prolific authors in this field account for 30% of the total sample (Silvius #34, Brent #17, Huemann #16, Gareis #13, Labuschagne #9, and Martinuzzi #7). In terms of author affiliation, it is apparent that roughly half of the published material emerges from traditional university departments (predominantly engineering, information systems and business and management, with interests in PM). The other half arises from research centres dedicated to sustainability research or from engaged practitioners who have hybrid affiliations across universities and private corporations.

Table 5: Top 5 most frequent Journals

Title	#	Description & discipline
Journal of Cleaner Production	16	Transdisciplinary & international on research concepts, policies, and technologies ensuring progress towards making societies and regions more sustainable. Encourage implementation of new, cleaner structures, systems, processes, products and services.
International Journal of Project Management	12	Offers wide ranging and comprehensive coverage of all facets of project management.
Sustainability	10	International, cross-disciplinary, scholarly and open access journal of environmental, cultural, economic, and social sustainability of human beings.
Project Management Journal	9	Shape world thinking on the need for and impact of managing projects by publishing research to advance theory and evidence-based practice.
PM World Journal	6	Non-refereed e-Journal, by PMI and containing articles, papers and stories about project and programme management.

The last metric of the descriptive analysis uses the journal keywords. Grouping and counting all keywords from journal articles (Figure 4 shows the top 10) reveals how 'construction' is the most common keyword, while 'system' and 'process' are frequently used with very non-specific meaning (often linked to other words or related to a project context). It is not surprising to find also 'social' and 'environmental' in the top 10 as they are (together with 'economic') two of the three pillars of sustainability.
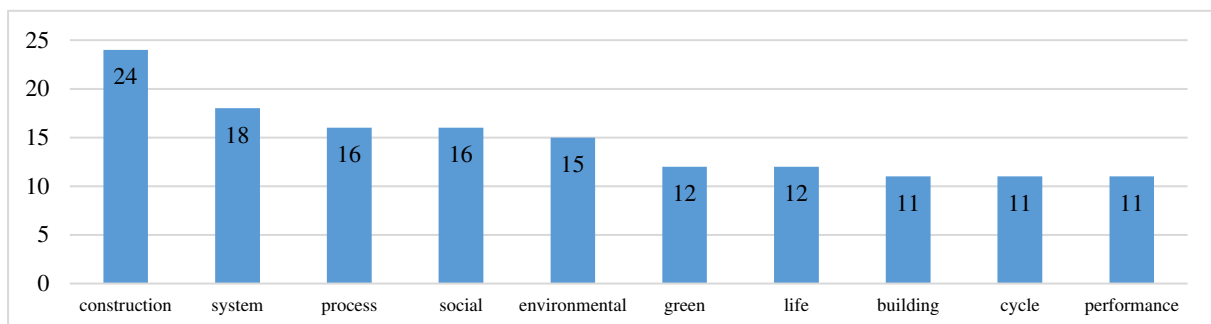

Figure 4: Top ten journal article keywords

To briefly summarize the descriptive analysis, it is clear that the field is rapidly growing in terms of publication numbers. This rapid growth has been widespread with publications in many different journals and from many authors from diverse countries (albeit with some concentrations). The publications show how the topic is cross disciplinary as the affiliations of authors range across different research fields. With any topic being rapidly developed over a short time span, it is normal to find some confusion over concept definition, disciplinary boundaries, or units of analysis. This reflection will be clearer in the following section where the thematic analysis is reported.

Thematic analysis

The thematic analysis aims to describe the current state of research on SPM by looking systematically at the theoretical frameworks employed, the methodologies adopted, and the context of the research. In this way, it is possible to draw some conclusions about the main features of research carried on this topic.

The analysis of theories used by authors to structure their work reveals that less than 1% of papers clearly set the work within a specific theoretical context. As such, topic under-theorisation can be inferred. Moreover, as this is a key limitation, we can suggest this as an important direction for future studies, in line with other research where it was found that "almost all papers do not provide details about the theoretical foundation" (Sánchez and Schneider, 2014). Killen et al. (2012) also observed how PM and portfolio project management research in general remain largely atheoretical. SPM research, quite clearly, is largely practice oriented, since few articles have been embedded within a theoretical framework.

Another thematic dimension concerns the methodologies used. Figure 5 shows the qualitative single case study analysis to be the most common approach by far. Indeed, for relatively new streams of research, where concepts are not completely clear and further exploration is needed, this is to be expected.
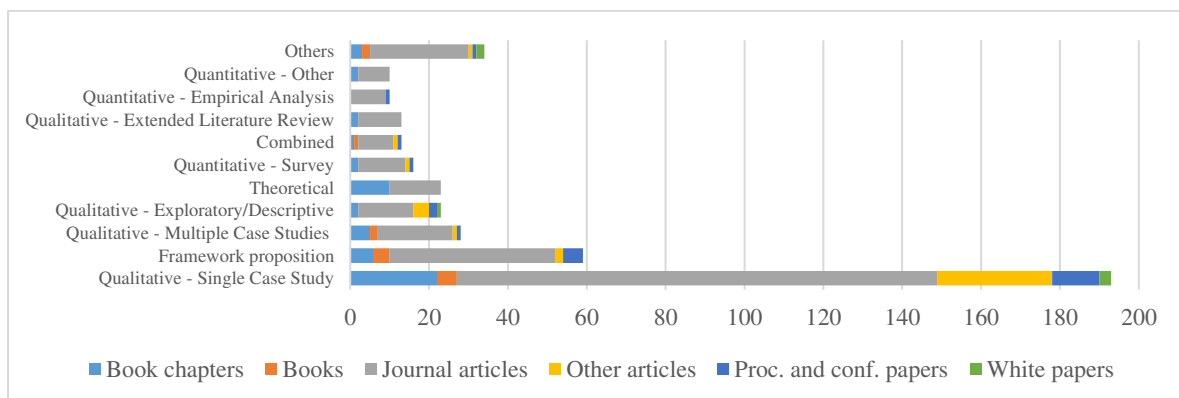
Figure 5: Methodologies used in the sample

A further thematic dimension evaluates the research field in which the article's research has been situated (Figure 6). To consider the research context, we divided the articles first into the following broad categories: public ('PU' in the figure), private ('PR' in the figure), Joint public and private and generic[12]. Public and private have also been detailed into subcategories (Services, Construction, Other infrastructure, Manufacturing). As shown by Figure 6, the

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[12] The term Generic refers to papers whose research considers all kinds of projects without distinction of context, while "other infrastructure" refers to all other kind of projects in sectors not listed in other categories (construction, manufacturing, technology, and services).

biggest category is *PR-Generic*. Most authors analyse the sustainability concept *per se* without placing it within a specific field. These kinds of works are mainly intended to define sustainability or simply provide general suggestions and recommendations about it. They express concepts and ideas about sustainability in PM that can be applied to all kinds of circumstances. Another significant context in which the research has been placed is related to *services* (public#120 and private #57). This category includes papers relating to such contexts as the sustainable management of resources, energy consumption, health improvement in poorer regions, education in a particular sustainable practice, and other environmental and social issues. This category has surpassed (in terms of number of publications) the traditionally most researched and analysed field of *construction infrastructures* (Hwang and Ng, 2013; Sánchez, 2015; Sánchez and Schneider, 2014). Papers on public and private services very often engage the social pillar of sustainability, while construction oriented works are more balanced across the three pillars of sustainability.
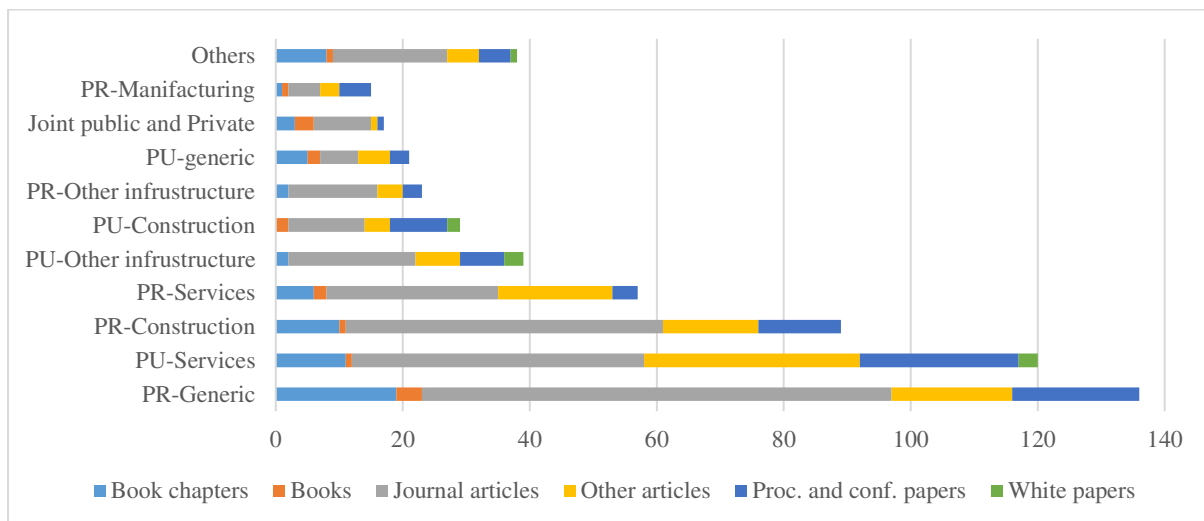
Figure 6: Context of research (PU: public sector, PR: private sector)

The novelty of the field emerges clearly from this thematic analysis. The lack of theorization, the methodology applied (predominantly qualitative with case studies and/or framework proposition) and the context of research (dominated by generic case studies of projects) are typical characteristics of a research field seeking order. In the next section, to illustrate the

ongoing debate on SPM, we discuss a selection of journal articles that help us to portray the three different themes that emerged from the NVIVO11 word tree model.

Descriptive general discussion

The descriptive and thematic analyses substantiated that, although SPM is a new concept, it is no longer a very original one. In this second step of the review we focus on works considering sustainability within project management processes. We therefore suggest a way to interpret this literature by conceptualizing papers according to the nature of their contribution. As described in the methodology, with the help of NVIVO11 software we suggest a simple outline to conceptualize SPM into three categories of narrative. These categories provide an ordering of the sample and highlight three different narratives developing around the concept of SPM: (1) motivations for the integration of sustainability into PM practices (the 'why' question); (2) the extent to which sustainability affects PM practices (the 'what' question); and (3) determinants for the optimal implementation of SPM (the 'how' question). We therefore used the PM papers sampled from the key journals to supply examples of contributions to the emerging narratives and are displayed in Table 6.

Table 6: Research category sets

Nature of contribution	Description	Frequently associated words	Underpinning logics
Why (value)	Relevance - describe and analyse value SPM brings for organizations or society	get; achieve; assess	Establish benefits
What (influence)	Theoretical implementation - clarify the extent to which PM has been affected by sustainability. Evaluating &integrating sustainability in PM	define; describe;	Exploration & clarification
How (frame/suggest /recommend)	Practical implementation - determinants for the optimal implementation of SPM	improve; integrate; implement	Suggestions for practitioners

The first narrative (*why - value)* is about the advantages or, in other words, the 'value' that sustainability brings to PM. This area reflects contributions advancing different reasons for integrating sustainability in PM practices and highlighting the value sustainability can bring to organizations and society. The common reasons behind the justification of these contributions

relate to the authors' attempts to push the implementation of new measures, stressing the 'value' of sustainability, and therefore to boost integration of these measures into PM practices.

The second narrative (*what - influence*) includes articles clarifying and/or defining the key characteristics of SPM. These contributions reflect articles seeking to define and operationalize key concepts, process and models within SPM.

The third narrative (*how - frame/suggest/recommend*) describes and suggests how sustainability can be achieved in a specific project or case study. Most of the contributions tend to be focused on qualitative case studies where researchers explore SPM from their own empirical context and experience. These contributions include analyses of projects that exhibit a particular sustainable feature implemented within the project[13].

In contrast to previous reviews, we have organized the SPM literature by clustering three abstract sets of meta-contributions: 'reasons to implement SPM, 'impact of sustainability on traditional PM', and 'methods of SPM implementation in project practices' as described above. In the next three sections we present and explain these three predominant narratives using the 44 papers listed in the Appendix 1.

Reasons to implement SPM (why)

The first of the three narratives that appear quite frequently in this literature relates to the justification of the field itself. Indeed, for a research field still in development, it is expected that researchers will dwell on its relevance (theoretical or practical), providing reasons why the adoption of sustainable business practices into a project is sensible. However, the suggested reasons tend to be quite varied. Some of these include: 'moral imperative' (Silvius et al.,

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[13] As explained in the methodology, for the discussion of the emerging narratives we considered in detail only articles from relevant PM journals. It is worth underlining that any publication may have more than one narrative in its text. A notable example is the early work of Van Pelt (1993). In this book, in the initial chapters, he highlights how environmental issues have increasingly changed traditional approaches to PM (first narrative), then explores two case studies with the idea of assessing frameworks for sustainability-oriented project appraisal (second narrative), and in the concluding chapters provides practical guidelines with regards to how to account for sustainability concerns in each project evaluation phase (third narrative).

2013a), organizational resilience (Perrini and Tencati, 2006), the organization's economic prosperity (Gareis et al., 2011), long term performance (Russell and Shiang, 2012). We exemplify contributions from articles extracted from PM journals in the following table.

Table 7: Examples of contribution from narratives explaining reasons to implement SPM

Reasons to implement SPM (why adopt it?)	
Economic (project success)	Significant relation between project sustainability management and project success (Carvalho and Rabechini, 2017).
	Consider how sustainability impacts project success (Martens and Carvalho, 2016).
	Achieving sustainability is becoming increasingly critical for measuring the overall success of infrastructure projects (Yuan, 2017).
	(1) Better cope with complexity; (2) reduce project crisis situations (cancellations, interruptions, and fluctuations); (3) creates a competitive advantage (Gareis et al., 2011).
Reputational / ethical	Ensuring long term project success if included in organizational strategic vision (Dalcher, 2012).
	Demonstrate a generalized desire by organizations to consider sustainability more (Silvius et al., 2013b).
	Improve public reputation, brand reputation and reduce projects risks (Russell and Shiang, 2012).
Long-term organizational benefits	Encourages the consideration of a broad group of stakeholders and leads to co-creation of project benefits with them (Keeys and Huemann, 2017).
	Leads to organizational resilience (Perrini and Tencati, 2006).
	SPM is an important thing to consider to 'stay in business' (Ebbesen and Hope, 2013).
	Maximize effects of organization value management by integrating sustainability (Abidin and Pasquire, 2007).
	SPM helps to align projects to strategic management in the construction sector (Herazo et al., 2012).
	Aligns long-term strategic objectives with short-term needs (Brook and Pagnanelli, 2014).

The most common underlying justification is an economic one (Brook and Pagnanelli, 2014; Carvalho and Rabechini, 2017; Dalcher, 2012; Gareis et al., 2011; Herazo et al., 2012; Martens and Carvalho, 2016; Russell and Shiang, 2012; Yuan, 2017). Consideration of sustainability in the implementation of projects leads to improved economic performance. With this argument, researchers aim to persuade even the most sceptical of managers of the importance of sustainability beyond the moral imperative or the purely ethical considerations (Silvius et al., 2013a).

Gareis et al. (2011) note that benefits of SPM are better exploited when change happens at the level of the 'core' processes of an organization (also Dalcher, 2012). Encouraging project managers to consider negative social and environmental impacts, improves the overall project success (Carvalho and Rabechini, 2017). Keeys and Huemann (2017) suggest a wider view of

value management, with the consideration of 'co-creation' of sustainability benefits among a project's stakeholders.

Reputational motivations stem from the consideration of public opinion. Even if the process of embedding sustainability into a company's culture is recognized to be 'immensely challenging' (Russell and Shiang, 2012), the swing of public opinion has provided a strong impetus toward those changes and developing products and services that are "progressively more sustainable" (Russell and Shiang, 2012, p. 2) enables organizations to distinguish themselves from their competitors. Silvius et al. (2013b), through an empirical study of over 56 organizations, demonstrated that, besides the 'economic reason', organizations often deliberately decide to adopt SPM as a purely ethical concern.

Finally, contributions also reflect a longer-term perspective representing benefits to the organisation beyond the project itself. SPM, ultimately, is seen as important for organizational survival (Ebbeson and Hope, 2013)

The take home message from the contributions to this narrative is the importance of careful SPM consideration. Its achievement constitutes a big challenge, nevertheless it carries the potential for considerable short and long-term benefits. Full implementation may require a change in the core practices and values of the organization, and it will need to be continuously assessed, with a system of evaluation and assessment to maintain regular improvements[14] (Perrini and Tencati, 2006).

Impact of 'sustainability' on traditional PM (what)
The second dominant narrative in this literature analyses the extent to which 'sustainability' affects the discipline of PM. In other words, it looks at high level theoretical changes to

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[14] Other examples of sustainability performance evaluation systems have been identified in the construction industry (Fernández-Sánchez and Rodríguez-López, 2010; Nguyen et al., 2015; Siddiqui et al., 2009), the manufacturing sector (Labuschagne and Brent, 2005), demolition waste management (Klang et al., 2003), software architectures (Koziolek, 2011) and cost accounting (Brent et al., 2007).

traditional and established PM tools, techniques and methodologies that are required in order to embrace sustainability.

However, given the different perspectives on what the impact of sustainability on PM may be, this narrative presents a heterogeneous set of contributions. We organize this narrative in three levels: micro-level (considering the sphere of the individual project manager), project level, and macro-level (considering long term effects on the entire project environment). The three levels of this narrative are summarised in table 8 below.

		To what extent does sustainability affect PM practices (the 'what' question)?	
Micro-level (individual)	Decision making		• Consider individual decision-making processes of the project manager (Silvius et al., 2017). • Discuss key factors for sustainability in PM context, through a project manager lens (Martens and Carvalho, 2017).
	Competencies		• Understand what competencies a project manager needs to develop to achieve sustainability: systems thinking competencies, anticipatory competencies, normative competencies, strategic competencies, interpersonal competencies (Silvius, 2016). • Develop and implement curricula that equip graduates with new sustainable professional capacities (Gaziulusoy and Ryan, 2017).
	Intrinsic motivation		• The project manager should be intrinsically motivated to work on a sustainable project and achieve sustainable results (Goedknegt, 2012).
Project-level	Trade-offs in objectives		• Introduce a methodology to identify, classify and prioritise sustainability indicators based on risk management standards (Fernández-Sánchez and Rodríguez-López, 2010).
	Obstacles & Ambiguities		• SOCIAL – e.g. the difficulty of involving local communities in rural development projects (Pade-Khene et al., 2011). • COGNITIVE – e.g. ignorance of the sustainability concept amongst project stakeholders (Al-Saleh and Taleb, 2010). • FINANCIAL – e.g. green construction methods are costly to implement (Hwang and Tan, 2012); – e.g. specific modifications to conventional building practices to optimize the delivery of cost-efficient green building projects (Robichaud and Anantatmula, 2010). • AMBIGUITIES - Present an ontology, which combined with social and environmental requirements, can assist constructors and other stakeholders to gain a better understanding of sustainability issues (Edum-Fotwe and Price, 2009).
	Areas to be changed		• Propose and validate a model for Project Sustainability Management (Carvalho and Rabechini, 2017). • Identify Critical Success Factors (CSFs) to properly integrate sustainability into project management practices of construction projects in developing countries (Banihashemi et al., 2017). • Framework to guide integration of sustainability issues in value management (Abidin and Pasquire, 2007). • Analyse how various approaches to stakeholder management and sustainable development principles are included in PM standards (Eskerod and Huemann, 2013). • Consider sustainability as a key factor to be included in project planning and implementation (Ebbesen and Hope, 2013). • Analyse PM problems posed by sustainability indicators (Sánchez, 2015). • Present a 5-step framework for integrating sustainability in the innovation project portfolio management process in the field of product development (Brook and Pagnanelli, 2014). • Identify relevant dimensions of sustainability and areas of impact of sustainability on project management (Silvius and Schipper, 2014b). • Provide a framework for integrating sustainability into project baselines for consulting engineering projects (Talbot and Venkataraman, 2011)
	Assessments		• Identify control practices that organizations can use for SPM (Kivilä et al., 2017).
Macro-Level (entire project environment)	Long term considerations		• Show the level of integration between sustainability and project management through a literature review (Marcelino-Sádaba et al., 2015). • Suggests that sustainability should be considered a new school of thought project management discipline (Silvius, 2017). • Suggest a conceptual system to measure and control companies' behaviour to assess whether they are responding to stakeholder concerns effectively (Perrini and Tencati, 2006). • Policy framework to improve the contributions of projects to sustainable development (Gregersen et al., 1994).
	Systemic knowledge gaps		• Integrate, by identifying knowledge gaps, environmental dimension into the project management of new products to increase the effectiveness of eco-design (Brones et al., 2014). • Need to embed sustainability within value management practices in Gulf Cooperation Council countries (Al-Saleh and Taleb, 2010).

The impact of sustainability on traditional PM at micro-level

The impact of sustainability on traditional PM at *micro-level*, which considers the sphere of the individual project manager, includes contributions analysing (a) the decision making process, (b) individual competencies and (c) intrinsic motivation of the individual project manager.

This part of the SPM narrative starts from the assumption that it is the project manager who contributes most to the design of sustainability objectives in projects. Therefore, understanding project manager decision-making processes underpinning the definition of these objectives, is very important (Goedknegt, 2012; Martens and Carvalho, 2017). Silvius et al. (2017) discover, not unexpectedly, that project managers are more inclined to focus on the triple constraint criteria (i.e. time, cost and quality) than on the triple bottom line (i.e. economic, environmental, and social dimensions). Relatively few sustainability objectives are implemented and tend to be considered only when they match business objectives (e.g. stakeholder management) or are required by law (e.g. health & safety).

From this reflection, it appears clear that some intrinsic motivation at individual level is needed to change traditional and established PM processes. Therefore, even if "project manager can influence the way sustainability is implemented in the project and the project management process" (Goedknegt, 2012, p. 18), this motivation cannot belong solely to the project manager. Indeed, other project entities, such as the sponsor or other stakeholders can be responsible for sustainability in the project conception or the business justification.

Another focal point to consider, when looking at the project manager individual sphere, are the competencies required to include sustainability in PM. The implementation of sustainable objectives requires specific competencies (Silvius, 2016). These skills, not traditionally taught in project manager education processes, therefore need to be achieved in the field (with

experience) or in the education process (e.g. at university level or with certifications) (Gaziulusoy and Ryan, 2017, p. 1297).

The impact of sustainability on traditional PM at project-level

The impact of sustainability on traditional PM at *project-level* presents a higher degree of variety in its contributions. Literature considers (a) which trade-offs in project objectives may be needed; (b) what are, and how to remove, obstacles & ambiguities; (c) specific areas that need to be adjusted; and (d) additional assessments required within the projects.

Probably one of the main problems arising from sustainability relates to the constraints that it poses that are often in opposition to each other; trade-offs are needed in just the same way as the conventional 'iron triangle' of PM. Sustainability represents a "trade-off between three competing ambitions: environmental protection, economic growth, and fairness for people" (Martek et al., 2018, p. 1). Studying construction projects, Fernández-Sánchez & Rodríguez-López (2010), highlight the importance of focusing on stakeholder relationships to be able to balance these different dimensions of sustainability. SPM poses fundamental problems of complexity when dealing with stakeholders, calling for the involvement of every participant in the project life cycle to find a proper balance between all actors.

Another way to look at these issues is to consider these as barriers to the SPM implementation. Research evidence suggests there are constraints of a *cognitive nature*, of a *financial nature*, or of a *social nature*. The extent of these barriers and constraints limits the integration of sustainability into PM tools and techniques.

To overcome these constraints, PM methodologies have to adjust to embrace sustainability practices and many articles provide similar lists of prescriptive actions. Typically, they involve the identification of critical success factors, creation of guiding principles or frameworks for integrating sustainability thinking into PM practices, or the analysis of problems stemming

from the use of sustainability indicators. However, all seem to agree that PM "requires some modification to meet the challenges of managing modern day projects" (Ebbesen and Hope, 2013, p. 10). Ultimately, the specificity of each project (namely the industry type, the ownership and organizational structure) and its participants means "that the success criteria list will never be complete" (Talbot and Venkataraman, 2011, p. 39).

A different angle to the analysis of sustainability impact on PM is the analysis of SPM assessment tools, intended to identify control practices that organizations can use for SPM (Kivilä et al., 2017). They highlight how the impact of sustainability on traditional PM at *project-level* resides also in the assessment mechanisms, confirming "the need to integrate sustainability into ordinary project control routines" (Kivilä et al., 2017, p. 1180).

The impact of sustainability on traditional PM at macro-level

The impact of sustainability on traditional PM at *macro-level* considers (a) how to balance long-term vs short-term objectives and (b) knowledge gaps at managerial and academic level.

Different time horizons characterizing sustainability and PM are at the source of the long versus short-term paradox highlighted in the introduction. In this context, Brones et al. (2014) explicitly frame the knowledge gap between sustainability and PM around three areas: *normative*, *professional* and *academic*. The first relates to the sphere of technical norms (International Organization for Standardization norms). In ISO's norms, the concept of PM is never mentioned in connection with sustainability, not even in the ecologically oriented ISO14062 and ISO14006 norms, which are considered to be the reference documents for the definition of eco-design. Even as far back as in 1994, a Policy Brief journal article on sustainability in PM recognized that "while its breadth of interpretation makes it politically appealing, it also makes the concept confusing as a point of reference for any concrete project activity" (Gregersen et al, 1994, p. 1). In terms of professional associations, Brones et al. (2014)

found that "current project management best practices […] traditionally ignore environmental sustainability" (Brones et al., 2014, p. 116), and as a consequence of that project managers display a "lack of awareness with regard to sustainability issues" (Al-Saleh and Taleb, 2010, p. 50). Finally, in the academic research context, Brones et al. (2014) find from a search for the term "project management" in conjunction with "eco-design" on ISI Web of Science, that in only 0.2% of papers (42 out of 25066 papers on PM) is there any sort of link between the two concepts.

Long-term macro-level considerations overlap with the 'how' narrative discussed below. Perrini and Tencati (2006) consider how essential stakeholder relationships (a common theme in relation to implementation questions) are in laying the foundations of long-term sustainable objectives in order to balance and integrate "financial and nonfinancial performance indicators, supporting […] a sustainability-oriented and responsive organization" (Perrini and Tencati, 2006, p. 305).

To conclude, it is undeniable that an influence of sustainability on traditional PM at *micro*, *project* and *macro* levels exists. Silvius (2017) has suggested that sustainability is now becoming an established school of thinking in PM, explaining how a school of thought needs to have a common *content*, an established *community* and to show a potential *impact* in both the academic and practitioner worlds. We would concur; even though the literature on this topic is still evolving, without question sustainability intimately is influencing traditional PM tools, techniques and methodologies. The contributions we have highlighted identify different causes for the influence of sustainability on traditional, established PM tools, techniques and methodologies. The effect of these causes is to suggest a rethink of PM approaches that, through careful scrutiny, are considered to need to change in order to achieve sustainability objectives.

Methods of SPM implementation in project practices (how)

The last of the predominant narratives identified relates to the analysis, description, and recommendation of concrete and practical mechanisms for implementing SPM. Contributions to this narrative dwell on practical examples of application of SPM in particular projects. This narrative naturally coexists with one or both the other two narratives, since every work using a single or multiple case study contains an example of a project conducted sustainably (e.g.: projects that for some idiosyncrasies establish an example of the sustainability topic in general; studies describing and framing how to implement sustainability metrics whilst managing projects).

One way to structure this narrative is to consider the different project phases (i.e. initiation, planning, execution and closure) individually, the lifecycle as a whole, and stakeholder management. Illustrative contributions are described in Table 9.

		How can SPM can be implemented? (the 'how' question)
PM phase	Initiation	• Improve consideration of environmental aspects with improved public policies and rigorous professional guidelines (the case of a project in South Africa) (Labuschagne et al., 2005). • Improve feasibility study in construction projects where only economic performance is considered (the case of China) (Shen et al., 2010). • Project manager influence in the initial stage of the project, providing an holistic view and long term orientation (the case of the Utrecht Science Park – Goedknegt, 2012).
	Planning	• Design better procurement routes in construction projects to consider the environmental dimension (Zuo and Potangaroa, 2009).
	Execution	• Consider sustainable indicators for the construction phase (Brent and Labuschagne, 2006). • Sustainable capabilities can change due to the impact of various dynamic variables: technological advancement and people perceptions (Zhang et al., 2014).
	Closure	• Introduction of a Mine Closure Model (MCM) based on PM principles, to manage the closure process and assist the governing body with the sustainable asset life cycle management (Fourie and Brent, 2006). • Consider sustainable indicators for the decommissioning phase (Brent and Labuschagne, 2006).
Whole lifecycle		• 8 strategies (used by project organization and its host) to delivery an innovative seawater-based heating solution in Norway (Aarseth et al., 2017). • Top 5 factors to take into account when implementing a civil engineering project: energy consumption, waste management, ecological footprint, CO2 emissions, and health and safety (Fernández-Sánchez and Rodríguez-López, 2010). • 3 phases of the project life cycle on which positive social impact can be reached: construction phase, the operation phase, and the decommissioning phase (Brent and Labuschagne, 2006). • Analysis of sustainability in building projects from a whole life project management perspective (Wang et al., 2013). • Analysis of governance instruments to improve considerations of sustainability in private-public partnerships (Hueskes et al., 2017).
Stakeholder management		• Define typical stakeholder and conflicts in railway projects (Yuan, 2017). • Contribute to the development of new sustainable business models in projects by including all stakeholders (Keeys and Huemann, 2017). • Establish a method to identify and select an indicator set that includes every participant involved in the life cycle of a project, to find an appropriate balance between all actors (Sánchez, 2015). • Propose revisions in governance policies and support systems to improve sustainability in private-public partnerships (Agarchand and Laishram, 2017).

PM phases

Two very well cited works in this category (Labuschagne et al., 2005; Shen et al., 2010) indicate the importance of implementing SPM at the outset of the project. The narrative also identifies the need on the one hand, for more public policies and, on the other, for more explicit and rigorous professional guidelines in the PM discipline, coupled with the development of

"suitable environmental indicators … to provide designers and project managers with the necessary protocols to internally assess processes" (Labuschagne et al., 2005, p. 42), including those of procurement (Zuo and Potangaroa, 2009) and other aspects of *execution* (Brent and Labuschagne, 2006). The unpredictability of the variables affecting the project manager's ability to implement SPM are emphasised (e.g. Zhang et al., 2014). Finally, sustainability issues become very important in the project closure phase (Fourie & Brent, 2006), particularly issues of decommissioning and impacts on local communities and ecosystems. The study of effects occurring after project closure, notwithstanding its potential sensitivity, is somewhat under-emphasised in the literature. Projects are often blamed for abandoning the artefact that has been produced during the life of the project (e.g. maintenance phase see Rocchi et al., 2016), raising significant sustainability issues (Hodgson and Cicmil, 2016), particularly in the context of projects undertaken in developing countries. Studies of such projects are a significant aspect of this narrative.

Whole project lifecycle

The second category of narratives on methods to implement SPM in project practices relates to contributions on the implementation of SPM over the whole *project lifecycle*. Typically, these studies list (and rank in order of frequency) several success strategies for SPM implementation across all project phases. One limitation with such prescriptive lists is their incommensurability. If we try to compare Wang et al (2013) with Fernández-Sánchez and Rodríguez-López (2010), both set in a construction context, it is possible to note how they tend consider different things. This observation draws attention to the high level of contextuality of the concept of sustainability and compromises in the trade-off between environmental, economic and social considerations will have a different shape every time the debate amongst project decision makers takes place. Brent and Labuschagne (2006), however, note that

approaches to the measurement of social impacts are less well developed than indicators for measuring environmental impact.

At a strategic level, Aarseth et al. (2017) demonstrated that strategies to implement SPM can be divided into 3 groups according to the implementer: the *project organization* (setting strategic and tactical goals, developing supplier practices, and emphasizing sustainability in project design), the *host organization* (setting policies, influencing project practices), or *both* mutually (inclusion of sustainability-promoting actors in project organization, developing competencies, emphasis in project portfolio management).

Stakeholder management

The last category of narratives on methods on how to implement SPM in project practices relates to contributions looking at stakeholder management (Agarchand and Laishram, 2017; Keeys and Huemann, 2017; Sánchez, 2015; Yuan, 2017). According to Silvius (2017), 'stakeholder management' is one of the defining characteristics of the school of thought on sustainability. Therefore, the consideration of a wide set of actors (i.e. stakeholders) in project decision processes will help tackle trade-off challenges arising from sustainability objectives and develop cooperation among them (Ruggieri et al., 2016). Contributions from this perspective tend to be quite recent and issues identified relate to how to address key stakeholders and their concerns (Sánchez, 2015), how to include all stakeholders to co-create project value (Keeys and Huemann, 2017), and mediation among the very different, and often competing, project interests (Yuan, 2017).

The literature suggests many ways in which sustainable practices can be applied in PM tools and techniques. Most of them are demonstrated to be effective in the context of the research but fail to become a mainstream way to conduct sustainable projects. Contributions to this

narrative are heterogeneous and fragmented and the question arises as to how generalizable the proposed solutions actually are.

Concluding discussion

In this literature review, we conceptualized SPM research through three narrative themes have sought answers to questions about the role of PM in helping to develop sustainable business practices. Through a mix of descriptive and thematic analyses we have identified the main characteristics of this literature and the three underlying narrative themes. Table 10 provides a summary of this analysis.

Table 10: Summary of the three narrative themes

	Why	**How**	**What**
Crucial question	Why adopt sustainable business practices into projects?	What is the impact of sustainability on traditional project management practices?	How is sustainability embedded in project practices?
Definition	Motivations for the integration of sustainability into PM practices.	The extent to which sustainability affects PM practices	Determinants for the optimal implementation of SPM
Organizing framework	• Economic (project success) • Reputational / ethical • Long-term organizational benefits	• Micro-level (individual) • Project-level • Macro-Level (entire project environment)	• PM phase • Whole lifecycle • Stakeholder management
Key foci of papers	Justification of the field, dwell on its (theoretical or practical) relevance, providing reasons why the adoption of sustainable business practices into a project is sensible.	High level theoretical changes to traditional and established PM tools, techniques and methodologies that are required in order to embrace sustainability.	Analysis, description, and recommendation of concrete and practical mechanisms for implementing SPM.
Typical contribution	Makes a business case for sustainability, and ethical concerns.	(1) Individual project manager skills & capabilities; (2) implementation at project level; and (3) analysis of long term effects.	Practical examples of application of SPM in particular projects
Philosophical underpinnings	Typically couched in rationalist terms of ultimate economic imperatives and the business benefits that derive from a sustainability focus.	Reflects adjustments needed within the pre-existing rationalist framework of PM and actions that enable a conventional business case to be made.	Sets methods for sustainability implementation within a conventional rationalist strategic planning perspective.

We now highlight and summarize the main trends, gaps and undertheorized/underdeveloped areas in the field of SPM research.

Concept definition

We started with a discussion of the concept of SPM, and the apparent confusion between sustainability in PM processes and sustainability of the project product or output. Our review indicates that this remains a critical issue. In spite of the efforts of some researchers, to convey different SPM aspects under a shared definition and avoid an 'unproductive confusion of tongues' (Bakker et al., 2005) this has generally not been the case. This is not necessarily a negative thing as "fields with too little pluralism run the risk of being caught in a specialization trap, while fields with too much pluralism run the risk of being caught in a fragmentation trap" (Knudsen, 2003, p. 263).As a first concluding discussion point, we seek to balance the tension between 'unification' and 'fragmentation' by describing the SPM literature in terms of three underlying narrative themes. The field is undoubtedly growing rapidly (Figure 1), and the relatively abstract nature of the concept of 'sustainability' makes the study of SPM difficult and creates definitional ambiguities. Indeed, as Tufinio et al (2003, p.98) suggest, the focus "could be profit, it could be the planet or it could be the people, but it is difficult to find a balance among the three elements (while the original definition emphases [sic] the balance), which might open the possibility for opportunistic or polarized perspectives". This confusion results in a diversity of perspectives and foci that makes comparison of SPM research findings very difficult. In many cases we find papers developing theoretical frameworks directly from their own (single or multiple) case study samples. Very few have a comparative or longitudinal component (although given the novelty of the field, it could be too soon to see any genuine longitudinal studies emerging).

Coherence of the discipline

SPM research is widely distributed amongst authors from many different countries, publishing in a diverse range of journals with no clear pattern of dominance, in line with the findings of Brones et al. (2014). On the one hand, the broad geographic dispersion of authors is encouraging, since different perspectives and contexts help to build new knowledge through

diversity and the potential for comparison and validation of findings. On the other hand, because the field is so young, there is as yet no clear preferred outlet for SPM research and the journals have not had time to develop their reputations for publication of rigorous research in this field. There remains the risk of the development of parallel streams of research that do not relate to each other and thereby hinder the development of new knowledge and the creation of a coherent field or discipline. Different disciplines may advance distinct debates on PM and sustainability that are not easily reconciled. This does, however, represent a future research opportunity to help fashion a distinct field of SPM research.

The way in which most research to date has been conducted, through single or multiple case studies, indicates its predominantly explorative nature. A clear developmental pattern for the field cannot be discerned as yet. Gerde and Wokutch (1998) in a review covering a similar time span (25 years), in an analogous filed (CSR), highlighted four distinct chronological phases of development: "gestation and innovation" in the 1960s, "development and expansion" from 1972-1979, "institutionalization" from 1980-1987, and "maturity" from 1988-1996 (Gerde and Wokutch, 1998, p. 416). This doesn't seem to happen in the SPM field, where a clear evolutionary pattern is still missing. Papers that uncover aspects of sustainability (Brones et al., 2014; Marcelino-Sádaba et al., 2015; Silvius and Schipper, 2014a) appear contemporaneously with, or later than, others developing tools that implement those concepts (Brook and Pagnanelli, 2014; Sánchez, 2015; Silvius and Schipper, 2010; Talbot and Venkataraman, 2011). New concepts continue to emerge and this can hamper rigorous development. This is consistent with the 'variegational view' expressed in other research (Bakker et al., 2005) where the "realization of progress in the literature on the social responsibilities of business is obscured, or possibly even hampered, by the continuing introduction of new constructs" (Bakker et al., 2005, p. 284). At the moment, it is possible to recognize, simultaneously, traits of all four stages (i.e.: innovation, development, expansion

and institutionalization). An evaluation of the empirically grounded frameworks that have been introduced in the academic and practitioner literatures thus far would seem beneficial.

Project idiosyncrasies

Different projects may advocate for different SPM practices and different SPM methodologies may suit different project purposes. Factors influencing project 'idiosyncrasies' include industry type, form of project organization (single or multi-organizational) and ownership structure (public, private or jointly funded). The intersection of these contextual elements creates different needs in terms of sustainable practices; clearly the environmental impact of a large infrastructure project will differ from an ICT project. This raises an important question as to whether generic prescriptions for SPM are possible at all, or whether they need to be tailored to the specific project context, simply because the way in which sustainability is thought about and its manifestations differ.

The diversity of project settings gives rise to a further observation that there is something of an underdevelopment of managerial implications. Even though almost every paper that presents a case study includes a managerial implications section, if is often unclear as to whether the implications arising from one project can be directly applied to other (future) projects. Many examples are highly contextual and offer poor generalizability. We recognize that a more systematic consideration of the issues that managers face when integrating SPM in their projects would immensely improve the impact the SPM discipline could have in addressing this particular societal challenge[15].

Philosophical underpinnings

It comes as no surprise, given the strong practitioner focus in project management research, that much of the reviewed research takes a normative stance and reflects a rationalist perspective on project management, reflecting the observation that "research into projects and

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[15] See sixth point currently on the EU Horizon 2020 agenda: Inclusive Innovative and Reflective Societies.

project management remains heavily reliant on a functionalist, instrumental view of projects and organisations" (Cicmil & Hodgson, 2006: 111). Thus, the 'why' narrative is typically couched in terms of ultimate economic imperatives and the business benefits that derive from a sustainability focus, notwithstanding the occasional appeal to the 'moral imperative' (Silvius et al., 2013a). The 'what' narrative reflects adjustments needed within the pre-existing rationalist framework of project management and actions that enable a conventional business case to be made. Proposals for step-wise action plans or frameworks for integrating sustainability, identification of critical success factors, and the addition of sustainability to an established list of project performance criteria, as reflected in Table 7, are all consistent with a rationalist perspective aimed at providing the concerned project manager with the toolkit necessary for achieving sustainability targets. And the 'how' narrative similarly sets methods for sustainability implementation within a conventional rational strategic planning perspective.

SPM is thus largely seen as a relatively novel requirement for project management, but something that unproblematically can be integrated within current project management thinking and existing frameworks. We might suggest that this may prove to be the wrong starting point and that there is a need to problematize the issue. In this sense, what appears to be lacking in current SPM research is the adoption of a more critical view consistent with the 'making projects critical' research stream (Cicmil et al., 2006; Cicmil and Hodgson, 2006; Hodgson and Cicmil, 2016), which has questioned whether prescriptive methodologies, best practices and other propositions have "creatively contributed either to constructive debate in the field or to the resolution of difficulties encountered in practice" (Cicmil and Hodgson, 2006, p. 112). More specifically, this relates to the distinction between sustainable project outputs and sustainability in project management practices. The latter might be considered a case of 'doing things right' (i.e. with long-term objectives and sustainability in mind), whereas the sustainable project deliverable reflects 'doing the right thing'. The challenge is that SPM on its

own may be insufficient if at the end of the day it is doing the wrong things, albeit in the right way. It is perhaps a greater challenge for project managers seeking to implement SPM to question project objectives in this way.

As a note of clarification, advocating for more critical (non-rationalist, non-positivist) studies would seem in opposition to more framework-based research. Nevertheless, in accordance with Burrell and Morgan (2017), we suggest that different strands of research can follow different philosophical paradigms (that may be incommensurable). The advancement of a field may not require synthesis, but different streams of research to be independently advanced at the same time. Therefore, we suggest that non-rationalistic and framework-based are independent paradigms and can be usefully developed in parallel.

Distance from practitioner world

An important concluding note concerns the distance this stream of literature has from the practitioner world. From our in-depth consideration of this literature, we recognize that, although most contributions have practical implications for practitioners, the 'real world' of projects is itself advancing rapidly, with its own procedures and *ad hoc* solutions. Indeed a number of different PM professional actors are influencing the shift of the PM profession toward sustainability. For example, professional codes of ethics that embrace SPM, "formal endorsement of international standards, and the creation of bespoke standards and certifications on SPM" (Sabini et al., 2017, p. 4) are some of the actions performed by practitioners.

As societal pressures toward sustainability are very strong, the practitioner world is composed of a plurality of different type of actors, ranging from individual project managers, to PM professional associations at different levels (international and national chapters) and also to public (government agencies, e.g.: the Cabinet Office in the UK) and international bodies (e.g. ISO standards).

'Sustainability' is a very broad concept and very difficult to tackle holistically. Its introduction into PM standards can be achieved by disaggregating it into its different components and reflecting which component fits better with the context specific idiosyncrasies. SPM is a laborious process, complex to implement and difficult to achieve. In some state-of-the-art projects where excellent SPM performances are achieved, this happens by embracing gradual and adaptive changes to PM tools and techniques and by thinking over how the intended outcome for SPM are to be achieved in that specific project environment.

Directions for future research

By providing the three narrative themes, we hope to provide a common way to approach the concept of SPM and its application within project management. Here, project management could learn from development of the wider sustainability literature. The major academic debates around the definition of the concept of sustainability in management appeared in the late nineties (Margolis and Walsh, 2003; Wilkinson et al., 2001), where there was the need to establish some ground rules on what sustainability is and what it means. Once these were agreed, the field flourished by integrating sustainability concepts into several different management streams, such as supply chain management (Srivastava, 2007), corporate social responsibility (Carroll and Shabana, 2010; Du et al., 2010; Lee, 2008), and innovation management (Adams et al., 2016, 2006). There is a similar need for the PM literature to focus on establishing those ground rules for SPM to be integrated and developed into different PM streams (life cycle management, stakeholder management, etc.). This is after all a recurring issue in the PM literature, as Söderlund has underlined: "for several decades, project management research struggled to strike a balance between the elaborations of a theory of project management that was generic and general yet allowed for applications to different types of projects" (Söderlund, 2011, p. 160).

Underlying this need is the wider issue that is being recognised within the broader social science community of a need for a more inter-disciplinary approach to research in order to solve the more intractable societal challenges of the 21st century (Schoolman et al., 2012). This interdisciplinarity would help to overcome the division and barriers between different specialisms and aid the integration of sustainability thinking with project management thought and practice.

Sustainability imperatives and associated project performance requirements pose major challenges for project managers, not least in terms of stakeholder management. Much of the research reviewed raises questions about the increased complexity in projects arising from the need to integrate sustainability concerns and the need to satisfy a wider group of stakeholders. This impinges on the 'lived experience' (Cicmil et al., 2006; Winter et al., 2006) of the project managers tasked with delivering sustainable projects and sustainable project management. There is therefore a need for future research to focus on how managers understand SPM and how they deal with the ambiguities and incommensurability of sustainability demands in relation to more conventional project performance objectives and measures. This implies a need to understand the particular frames that project managers use to make sense of sustainability concepts and to integrate "different reinforcing, neutral, and conflicting connections between and among sustainability dimensions" (Hahn et al., 2014, p. 468). Therefore, research in SPM, by focusing on cognitive fames managers use to reconcile SPM ambiguities, could provide "useful heuristic devices to understand managerial decision making in a sustainability context" (Hahn et al., 2014, p. 468). A more in-depth focus on the level of the individual project manager would help the SPM research stream to reduce the tensions managers face when adopting sustainability.

Going beyond this, recognising that sustainability is a value based concept, and that the individual project manager has a key role to play, implies that the values held by project

managers will be influential. These values will reflect individual characteristics, such as cultural background, education and gender, and also the values of the organization employing the project manager. The consideration of sustainability in decision making will depend in part on its importance to the project manager[16].

Just as there is a case for the integration of different disciplinary perspectives, so is there a case for the integration of scales of analysis. Whilst, an increased concern with the actuality of project management as experienced by individual managers promises to be a fruitful direction for research, so the role of professional bodies and other agencies at a meso or more macro scale merits consideration. There is perhaps an under-researched opportunity for intermediary bodies to take a lead in the instantiation of sustainability within professional codes of practice and in addressing wider ethical issues (Sabini, 2014; Sabini and Muzio, 2017).

The previously mentioned 'projectification of society' is creating new classes of project, notable amongst which are so-called 'megaprojects' (Flyvbjerg et al., 2003; van Marrewijk, 2015). Related to these are projects that extend the conventional project delivery cycle into a longer term operational phase (Alderman et al., 2014). Given their long-term focus, such projects are prime candidates for sustainability measures and indeed it has been suggested that long-term projects of this nature offer more realistic opportunities for creating sustainable outcomes (McLoughlin et al., 2009). Such projects also offer potential for longer term studies enabling research of a genuinely longitudinal nature. Greater understanding of the problems and potential solutions for achieving sustainability in major projects is more likely to be obtained through closer research engagement with such activities over time. We have noted the understandable current lack of such studies, but now is perhaps the time for researchers to start to develop them. Indeed, a critical approach could look at the apparent impossibility of

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[16] We are grateful to one of the anonymous reviewers for highlighting this issue.

implementing SPM in some projects, such as cases of failure to achieve sustainable solutions, or compromises and disputes arising as a consequence of SPM.

Ultimately, sustainability is about survival and the long-term future of the planet and the species, including human beings, living on it. Creating a sustainable future requires actions in the present and the idea that 'projects create the future' (Huemann and Silvius, 2017) seems to us most apposite. This requires the discipline to break free of the conventional 'Iron Triangle' (Atkinson, 1999) and put 'projection' back into projects to create the 'future perfect' (Clegg et al., 2006) or the realisation of a desired (sustainable) project outcome.

Acknowledgments

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< The complete list of 770 items of the systematic review is available on request >

Appendix 1

Papers selected for the descriptive general discussion

Reference	Why adopt sustainable business practices into projects?	What is the impact of sustainability on traditional project management practices?	How is sustainability embedded in project practices?	Cit.
(Aarseth et al., 2017)			x	46
(Abidin and Pasquire, 2007)	x			84
(Agarchand and Laishram, 2017)			x	6
(Al-Saleh and Taleb, 2010)		x		41
(Banihashemi et al., 2017)		x		28
(Brent and Labuschagne, 2006)			x	251
(Brones et al., 2014)		x		93
(Brook and Pagnanelli, 2014)	x			72
(Carvalho and Rabechini, 2017)	x			32
(Dalcher, 2012)	x			8
(Ebbesen and Hope, 2013)		x		51
(Edum-Fotwe and Price, 2009)		x		157
(Eskerod and Huemann, 2013)			x	129
(Fernández-Sánchez and Rodríguez-López, 2010)		x	x	233
(Fourie and Brent, 2006)			x	47
(Gaziulusoy and Ryan, 2017)		x		8
(Goedknegt, 2012)			x	12
(Gregersen et al., 1994)		x		4
(Herazo et al., 2012)	x			27
(Hueskes et al., 2017)			x	25
(Hwang and Tan, 2012)		x		182
(Keeys and Huemann, 2017)	x		x	14
(Kivilä et al., 2017)		x		32
(Labuschagne et al., 2005)			x	93
(Marcelino-Sádaba et al., 2015)		x	x	100
(Martens and Carvalho, 2016)	x		x	40
(Martens and Carvalho, 2017)		x		54
(Pade-Khene et al., 2011)		x		60
(Perrini and Tencati, 2006)	x			487
(Robichaud and Anantatmula, 2010)		x		291
(Russell and Shiang, 2012)	x			26
(Sánchez, 2015)			x	88
(Shen et al., 2010)			x	238
(Silvius et al., 2017)		x		26
(Silvius, 2016)			x	9
(Silvius and Schipper, 2015)			x	19
(Silvius and Schipper, 2014)		x		45
(Silvius, 2017)		x		22
(Silvius et al., 2013)	x			1
(Talbot and Venkataraman, 2011)		x		35
(Wang et al., 2013)			x	34
(Yuan, 2017)	x		x	1
(Zhang et al., 2014)	x		x	80
(Zuo and Potangaroa, 2009)			x	43

Summary of the publications:

Papers selected for descriptive general discussion.

	2009	2010	2011	2012	2013	2014	2015	2016	2017
■ others		2	3	2	1	3			
■ JoCP		1				1	2	1	3
■ The J of M.PM							2		1
■ PMWJ				2	1			1	
■ IJMPB	1				1				1
■ PMJ	1	1		1		1			1
■ IJPM	1			1		1			7

■ IJPM ■ PMJ ■ IJMPB ■ PMWJ ■ The J of M.PM ■ JoCP ■ others