Sustainable Project Management: Revolution or Evolution?

ABSTRACT

The integration of sustainability into business practices and organizational strategy requires a rethink as to the way in which operations are managed. As managing projects increasingly play an integral role in business and society, the question is whether current project management definitions, methods, processes, practices and knowledge areas are fit-for-purpose in delivering sustainable outcomes. This paper will examine the impact of sustainability on the methods, processes, practices and knowledge areas used to manage projects. A comparison of evidence from the literature will identify the leavers that shape the current agenda and can assist in the development of a deeper understanding of the challenges faced by the discipline to move towards 'sustainable project management'. This agenda will identify key areas of focus for academics and practitioners before evaluating whether an evolution of project management towards sustainable project management is possible, or if a more revolutionary approach is required.

Keywords:

Sustainability; Project Management; Sustainable Project Management; Project Methodologies; Project Knowledge Management.

Introduction

Sustainability is increasingly recognized as one of the most important challenges of our time. Issues such as global climate change, poverty and inequity, and the unsustainable use of resources are becoming more commonly understood amongst the public, governments and organizations. As a result, the pressure on businesses to incorporate the principles of sustainable development into policies and activities is mounting. In turn, there is the pressure to broaden reporting and accountability from economic performance for shareholders to

sustainability performance for all stakeholders. Increasingly businesses are using projects as temporary organizations to deliver strategy and drive operations, and is known as 'projectification' (Lundin et al., 2015). Projects initialize investments in new products, markets, organizations, or infrastructures (Hurt and Thomas, 2009). Through these investments projects contribute to realizing long-term business objectives (Söderlund and Maylor, 2012). If an organization plans to incorporate sustainability into its organizational culture, goals and operations, project management is central in delivering and promoting sustainable project results. As a result of this role, projects can impact on and affect outcomes, and are the means through which our future is created (Bredillet, 2014).

There is currently a great deal of interest in the relationship between project management and sustainability. Sustainable project management has been identified as one of the most important trends for the study and practice of project management today (Alvarez-Dionisi, Turner and Mittra, 2016). This trend can be seen in a growing number of academic studies that relate to the integration of sustainability in project management (Silvius and Schipper, 2014). Despite this recent focus, the term 'sustainable project management' is relatively new, and has evolved from sustainable and green business practices. Yet project management differs from these operational business practices due, amongst other things, to the temporary nature of projects. However, this temporal nature of projects contradicts the long-term orientation of sustainable development. In order to ensure that the project is conceived, planned and delivered with a sustainable focus, project managers need to fully understand sustainability, its definition and terms. In addition, practitioners need to have the knowledge, skills and expertise to deliver sustainable solutions for their clients and/or host organizations. The development of sustainable project management is a response to the realization that many of the current project management frameworks do not effectively address the three dimensions of sustainable development, i.e., social equity, economic efficiency and

environmental performance (Hope and Moehler, 2014; Silvius and Schipper, 2014; Otegi Olaso et al.,2015; Aarseth et al.,2017). Despite these challenges it has become clear that the project management community is keen to incorporate sustainable practice, such as global environmental issues. Furthermore, it has been suggested that the discipline of project management is ideally placed to deal with these challenges (Sánchez, 2015; Marcelino-Sádaba, González-Jaen and Pérez-Ezcurdia, 2015).

Contradicting this increased level of interest to integrate sustainability principles into project management, the literature tends to focus only on examining the compatibility of sustainability and project management along with suggestions as to how this may be achieved (Huemann and Silvius, 2017; Marcelino-Sádaba, González-Jaen and Pérez-Ezcurdia, 2015; Silvius, 2017). In this respect, the academic body of knowledge tends to identify gaps in the literature and extend current thinking rather that challenge many of the fundamental theoretical assumptions. As Hällgren (2012) suggests, this current approach to project management research may hamper the development of the project management discipline by advancing theories that do not challenge long held, potentially misguided and out-of-date, assumptions. Therefore, the contribution of this paper represents a significant step in advancing knowledge on sustainable project management by providing a critical review of the literature on sustainability in project management.

Methodology

The review draws upon the growing academic body of knowledge on sustainability in project management through the general project management literature and the professional reports and studies that promote sustainability in project management. There are three studies that have previously sought to undertake literature reviews on sustainable project management: Silvius and Schipper's (2014) review and impact analysis; Otegi Olaso et alias

(2015) review of sustainability in project management which focused on innovation; and Aarseth et al.'s (2017) systematic literature review, which focused on project organisations and host organisations of projects attempting to support high-level sustainable goals. It is not the intention of this paper to repeat these studies, rather to use these reviews to critically evaluate the literature according to what has been identified as requiring further investigation.

Silvius and Schipper's (2014) review examined 164 publications covering the time period 1993-2013 with the aim of assessing how sustainability is defined or considered in the context of project management and the resultant impact on the management of projects. They discovered that when considering sustainability from a project management perspective a shift in the scope of the management of projects occurs from managing time, budget and quality to managing social, environmental and economic impacts (Silvius and Schipper, 2014). Otegi-Olaso et al. (2015) undertook a study to identify trends in the introduction of sustainable project management practices and theory. They found that in a sample of 30 peer reviewed journal articles, conference papers, books, and international standards that dealt with sustainable project management and sustainable innovation, the alignment of strategy to sustainability, sustainability performance, sustainability integration and business model innovation (see also Hope and Moehler, 2015) were common themes. The most recent review came from Aarseth et al.'s (2017), who identified 68 articles (published between 1995-2016) as relevant by targeting leading international journals publishing project sustainability research. In their review eight strategies materialised: Inclusion of sustainability-promoting actors in project organization, developing sustainability competencies, Sustainability-emphasis in project portfolio management (organisation independent), Setting strategic and tactical sustainability goals, Developing sustainable supplier practices; Emphasizing sustainability in project design (adopted by project organizations), Setting sustainability

policies, and Influencing sustainability of project practices (adopted by project host). After analysing these key papers, the following critical areas of study were derived:

- Project Management and Sustainability Definitions;
- Managing Project Knowledge;
- Project Management Success;
- Project Manager Competence; and
- Project Management Methods, tools and techniques.

The extant literature will be reviewed in these five key areas to establish whether the integration of sustainability into project management is possible given the current limitations of understanding, or if a more revolutionary approach may be required to challenge deeply embedded theoretical assumptions.

Literature Review

Project Management and Sustainability Definitions

In order to ensure that sustainability is integrated when projects are conceived, planned and delivered, project managers need to understand the definition and terms of sustainability. Prior to this, an understanding of the traditional definitions of the terms 'project' and 'project management' are required to establish their compatibility with sustainability definitions. The most common definitions stem from the various professional bodies that govern the discipline. The most prominent international project management professional bodies are the International Project Management Association (IPMA) encompassing predominately European project management professional bodies; the Association for Project Management (APM) based in United Kingdom; and US-based Project Management Institute (PMI).

The PMI defines a project as "a temporary endeavor undertaken to create a unique product, service or result" (PMI, 2017, p. 542). The APM defines a project as "a unique, transient endeavour undertaken to achieve a desired outcome" (APM, 2012, p. 150) whilst the IPMA defines a project as "a unique, temporary, multi-disciplinary and organised endeavour to realise agreed deliverables within predefined requirements and constraints" (IPMA, 2014, p. 36). Similarly, the concept of 'project management' has attracted a range of differing interpretations. The PMI suggests that project management is the "application of knowledge, skills, tools and techniques to project activities to meet the project requirements" (PMI, 2017, p. 542). The APM defines project management as "the process by which projects are defined, planned, monitored, controlled and delivered so that agreed benefits are realised" (APM, 2012, p. 151). Finally, the IPMA suggests that project management is "concerned with the application of methods, tools, techniques and competences to a project to achieve goals. It is performed through processes and includes the integration of the various phases of the project lifecycle" (IPMA, 2014, p. 36).

Whilst the definitions set out above differ both in tone and content, they share core elements. The temporal nature of the project is reflected in all definitions through words such as 'transient', 'temporary' and 'time constrained'. The nature of the project as a temporary organization was first articulated by Turner (1990) and has since become a defining characteristic that distinguishes project management from other business endeavors with a more operational or strategic focus. Similarly, there is some agreement that a 'project' must be unique. Again, this facet has been pointed out by Turner (1990) who suggests that no project will be exactly the same. Finally, the definitions all suggest that a project is undertaken to achieve a specific defined purpose. The definitions all focus on the application of tools and methods to achieve specific project aims and objectives. Accordingly, a project

must be time constrained, unique and produce an agreed outcome by employing a range of appropriate tools and methods.

When considering definitions of sustainability, there is little agreement on what constitutes the term despite the ubiquity of the concept. Definitions vary by scale and context and are constrained by ideology (Vos, 2007), suggesting 'sustainable development', is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development (WECD), 1987). Whilst useful, this definition is conceptual and does not reconcile the principles of sustainable development with the fundamental aim of business (and by extension managing projects) to create profit (Ebbesen and Hope, 2012). In response to this disconnection, the WCED definition has been extended in an attempt to apply the concept to specific scenarios and sectors. The International Institute for Sustainable Development (IISD) offers a definition aimed at commercial organizations, suggesting sustainability is "adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future" (IISD, 1994).

The term 'sustainability' in turn has been used in a number of phrases, such as 'sustainable development', 'sustainable communities', 'sustainable society', 'sustainable growth' and 'ecological sustainability' (Vos, 2007). In business, the term 'sustainability' is most often applied to concepts such as 'corporate sustainability', 'corporate social responsibility', 'responsible business' and 'corporate citizenship'. Three key dimensions of corporate sustainability integrate the economic, ecological and social aspects in a 'triple-bottom-line', combine short-term and long-term aspects and consume the income not the capital (Dyllick and Hockerts, 2002).

As with the definitions of project and project management, nearly all definitions of sustainability share common core elements. First, definitions must present a way of conceptualising environmental issues in relation to the economy and society (Vos, 2007). These interconnections are commonly described as a 'triangle' or 'three-legged stool', in a Venn diagram where all three elements intersect or in business terms are referred to as the 'Triple Bottom Line' (TBL). In order to achieve sustainable development, or act sustainably, the three dimensions of environment, economy and society are given equal consideration. Another core element that occurs in many definitions of sustainability is that of intergenerational equity where timescales are measured in decades, which are much longer than those usually considered in traditional business planning cycles (Vos, 2007). Finally, there is the notion that sustainable activities should protect, sustain and enhance the natural and social environments. Silvius and Schipper (2011) compared the key tenets of sustainability and project management in a model built upon by Hope (2012). Figure 1 replicates this model demonstrating the tensions evident when comparing the two definitions.

Insert Figure 1 about here.

Silvius and Schipper, (2014) performed a structured literature review examining the definitions of sustainability in project management. Their definition states: "Sustainable Project Management is the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economic and social aspects of the life-cycle of the project's resources, processes, deliverables and effects, aimed at realizing benefits for stakeholders, and performed in a transparent, fair and ethical way that includes proactive stakeholder participation" (Silvius and Schipper, 2014, pp. 79; Huemann and Silvius, 2017, pp 1067). They sampled a total of 164 publications which dealt with sustainability and project management over 20 years, finding that around half the

publications did not explicitly provide a definition of sustainability or sustainable development. Despite this lack of clarity, 28% of the sample publications did refer to the WCED (1987) definition of sustainable development as a conceptual starting point. Some authors have however sought to derive a working definition of sustainable project management. Tam (2010) has proposed a definition with reference to the traditional view of project management articulated in the former 5th edition of the APM Body of Knowledge (APM, 2006: 37): "The promoting of positive and minimising of negative sustainability impacts (economic; environmental; and social) within the process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realized and contributing to a sustainable society." Similarly Hope (2012) offers a definition which builds upon the WCED sustainable development definition and core project management principles: "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".

Finally, several project management professional bodies have sought to articulate sustainability in their Bodies of Knowledge (BoKs), with the APM suggesting that "sustainability describes an environmental, social and economically integrated approach to development that meets present needs without compromising the environment for future generations" (APM, 2012, p. 230). However, like the WECD definition of sustainability, these definitions do not articulate the tools and processes required to incorporate sustainability principles into the products and services produced, and also in the processes and practices of managing projects, programs and portfolios (Hope and Moehler, 2014).

Managing Project Knowledge

From a sustainability perspective the importance of knowledge management is becoming increasingly understood (Rooney and McKenna, 2005). Recent studies have examined the role of knowledge management in delivering sustainability and sustainable development outcomes across a range of sectors. Cotez and Ramirez (2014) examined the role of knowledge management in sustainable development in the Caribbean, concluding that knowledge is the regions most underused and untapped resource in developing sustainable business practices. Pietrosemoli and Rodriguez Monroy (2013) examined the relationship between sustainable construction and knowledge management and their impact to achieve sustainability goals. They concluded that knowledge management processes provide a strategy to allow learning from successes and failures to improve the performance of the renewable energy power generation and distribution projects (Pietrosemoli and Rodríguez Monroy, 2013). Ng and Chatzkel (2015) investigated the role of knowledge management for Corporate Social Responsibility (CSR) and sustainability performance. They suggested that the adoption of a systematic approach to knowledge management enables organisations to make use of both tacit and articulated knowledge for continuous improvement of social, economic and environmental performance (Ng and Chatzkel, 2015).

Effective knowledge management in the context of a project-based organisations has also emerged as a valuable means of establishing and sustaining competitive advantage (Ajmal et al., 2010). Knowledge management is regarded as a systematic approach to effectively manage knowledge to create value for an organization (Alavi and Leidner, 1999). Knowledge management is designed to make the enterprise act as intelligently as possible to secure its viability and overall success, and to realize the best value of its knowledge assets (Wiig, 1997). Since the late 1990s knowledge management has been the topic of an increasing number of academic articles and books (Hislop, 2010), and is an established key success factor in strategic and operational management.

The role of knowledge management in managing projects has been examined in the literature from a wide range of perspectives (see Müller et al., 2013 for a recent overview). For example, project-level studies have explored the transfer of knowledge within projects (Reich et al., 2008; Algeo, 2014, 2015), and across projects, (Williams, 2007), social practices (Bresnen et al., 2003; Sense and Badham, 2008; Johansson et al., 2013), and quality management (Kotnour, 2000). The role of the Project Management Office (PMO) in managing knowledge has also been highlighted by a number of authors (see for example: Müller et al., 2013; Pemsel and Wiewiora, 2013). A key task of the PMO is the management of project related knowledge, the means and ends to share knowledge when needed (Aubry et al., 2010). Müller et al. (2013) suggests the PMO provides increased competitiveness and organizational efficiency through the reuse of good practice, the encouragement of innovation, and prevention of re-work. Together with other project governance mechanisms, PMOs form an organization wide project management approach (Aubry et al., 2010). Despite this approach, a key challenge remains for projects and project managers to capture and share knowledge within temporary organizations. The temporal nature of the project often means that the knowledge gained by project teams is often lost after the team disbands (Müller et al., 2013).

To date only one study explicitly examines the integration of project knowledge management and sustainability knowledge. Kivits and Furneaux (2013) examined the role of Building Information Management (BIM) as a tool to facilitate collaborative knowledge management designed to improve sustainability issues in design, construction and assessment management practices. They found that recent advances in information technology have enabled advanced knowledge management, which in turn facilitates sustainability and improved asset management in the civil construction industry (Kivits and Furneaux, 2013).

In order to address the issue of managing project knowledge, the professional project management bodies have developed a range of reference guides, or BoKs. The PMI identifies ten knowledge areas in the guide to the Project Management Body of Knowledge (PMBOK ® Guide) in an attempt to standardise generally accepted project management practices (PMI, 2017). These knowledge areas include: integration; scope; time; cost; quality; human resources; communications; risk; procurement; and stakeholders. No special attention is given to sustainability (Martens and de Carvalho, 2016). There are also a range of generic skills that a project manager is required to master in order to deliver a successful project such as social skills, problem-solving skills, change management skills and decision-making skills (Hwang and Tan, 2010). Again, there is no particular reference made to the project manager being required to possess sustainability skills.

Despite the recent interest in sustainability by project management researchers and the professional bodies there is a distinct lack of integration of the BoKs and the principles of sustainable project management. It has been suggested that many of the current project management frameworks do not effectively address the three dimensions of sustainable development, i.e., social equity, economic efficiency and environmental performance (Ebbesen and Hope, 2012; Maltzman and Shirley, 2012). Although some aspects of sustainability can be found in the various standards it is significant that 'sustainability' is not covered as a knowledge area in any of the project management BoKs (Mui and Sankaran, 2004). This limitation is a key concern of proponents of sustainable project management.

Project Management Success

Since its introduction in the early 1950's the discipline of project management has sought to define criteria against which projects can be measured (de Carvalho et al., 2015). The traditional view of project success is associated with fulfilling time, cost and quality

objectives, the so called ‘iron triangle’ (Atkinson, 1999). However, several studies have recently investigated new dimensions of project success (de Carvalho and Rabechini Junior, 2014; Ebbesen and Hope, 2012; Ika, 2009). The question as to what constitutes a ‘successful’ project continues to be characterized by ambiguity (Ika, Diallo, & Thuillier, 2012). This ambiguity is exacerbated by the suggestion that there is no absolute success of any project, only the perceived success of the project (Ika, 2009). This is further complicated by the fact that ‘success’ may be perceived differently by each project stakeholder (Lim and Mohamed, 1999). Another issue is that of how success is evaluated and that this probable changes over time (Dvir and Lechler, 2004). Despite these challenges of defining project success, many authors consider efficiency and effectiveness as synonymous with successful outcomes (Belout, 1998). Finally, when considering project management success, it is necessary to distinguish between the success of the project, and the success of the project management process (Munns and Bjeirmi, 1996). The former relates to meeting the defined goals of the project and the larger organizational objectives, while the latter refers to the success of the project manager and project management processes (de Wit, 1988).

From a sustainability perspective, success criteria can vary widely. In contrast to many business focused endeavors, environmental and social management is often not linked to economic success (Figge et al., 2002). Accordingly, the success of sustainability projects is often defined by the projects performance against the TBL of economic, social and environmental criteria. In some projects, such as those in the field of international development, sustainability is listed as a success criterion. However, the benefits from the project must continue to be measured until the end of the project, rather than along the more business focused TBL concept (Ika et al., 2012). In parallel with this approach, criteria such as health and safety have been considered a success factor in projects, and employee

wellbeing can be considered a social sustainability concern (Almahmoud et al., 2012; Kometa et al., 1995; Kumaraswamy and Thorpe, 1996).

Almost a decade ago discussions of the UK Engineering and Physical Sciences Research Council (EPSRC) funded Network on Rethinking Project Management. The Network proposed an evolution of the traditional view of managing projects, from a linear lifecycle to achieve an objective or goal, to reflect the actuality of projects as social processes that are full of complexity, uncertainty and ambiguity (Atkinson et al., 2006). There have been some efforts to articulate the three separate dimensions of sustainability in project management. This view of projects involving social processes can be linked to the three dimensions of sustainability in project management, where there exists social equity, economic efficiency, and environmental performance. Ika (2009) suggests that social acceptability of a project is important. In this respect similarities can be drawn from the literature on CSR which discusses the importance of organizations securing a social license to operate (Castello and Lozano, 2011; Maon et al., 2015).

More recently studies have suggested that sustainability is in fact a new dimension of project success (de Carvalho and Rabechini, 2011; Ebbesen and Hope, 2012; Hope and Moehler, 2014), however the incorporation of sustainability into project management has been discussed for some time (Atkinson, 1999). Environment aspects are increasingly considered success factors in construction projects (Ahn et al., 2013; Chan and Chan, 2004). Despite this, sustainability principles, in particular the social and environmental dimensions continue to be a challenge to incorporate into how projects are managed (Sánchez, 2015). The major challenge to the successful implementation and alignment of project management, and therefore (often through programme and portfolio management (Hope and Moehler, 2014)) to the wider corporate sustainability strategy is not any technical procedural issue, rather the development of a sustainability-orientated people system (Tam, 2010). This people-

orientation of the social processes involved in managing projects places the project manager in a critical role.

Project Manager Competencies

The literature suggests that competent project managers are recognized as being important actors in determining the success or failure of a project, and by extension business organizations (Crawford, 2005). The view of the project as a temporary organization highlights the role of the project manager as chief executive of the temporary organization (Turner and Müller, 2003). As such, the project manager's leadership role is critical in motivating people and creating an effective working environment to enable the project team to meet their goals (Anantatmula, 2010). Several studies have highlighted skills critical for project managers to possess in order to deliver successful projects (Avots, 1969; Belassi and Tukel, 1996; Hwang and Tan, 2010). Project management activities are led by project managers who make decisions using their own experiences, heuristics, professional and industry standards, to comply with rules and regulations, while managing stakeholder needs (Bredillet, 2014). In an attempt to standardize and formalize these activities, project management professional bodies set out a range of competencies to assist project managers enhance their effectiveness. However, Turner and Müller (2003) recognise the need for additional competencies to those determined by the project management professional bodies, which are documented in various forms, such as BoKs. Recent literature has highlighted the importance of the CEO and other top management in achieving sustainability outcomes (Waldman et al., 2006; see for example: Wu et al., 2014; or Aarseth et.al., 2017). Therefore, project manager as CEO of the temporary organization is equally important in attaining sustainability outcomes (Ebbesen and Hope, 2012; Wang et al., 2014).

Successful sustainability initiatives often require some form of inspirational leadership, or managers that are able to demonstrate or 'live' the sustainability principles that they are attempting to integrate into their work. However, few project managers receive appropriate training and skills development in sustainability competencies (Tam, 2010). Schieg (2009) suggests that in order to conduct project management in a socially responsible way, project managers need to possess social competencies and the qualifications to develop and promote CSR. In addition, he suggests that the introduction of existing organizational CSR standards to the management of projects improves the cooperation between project stakeholders, resulting in enhanced efficiencies and trusting relationships (Schieg, 2009). Project managers often report that they are unclear on the concept of sustainability within the projects that they manage despite understanding the importance of using the approach to stay in business (Ebbesen and Hope, 2012). They understand the delivery of sustainable projects requires additional sustainability skills and knowledge. Here Turner and Müller (2003) suggest that should project management be recognized a profession. The practice would be dependent on an individual possessing appropriate levels of certification, or recognized competencies. However, with reference to compliance with the norms and codes of how projects are managed, Bredillet (2014) suggests that they should be revised to move away from the current normative deontological, consequentialist ethical approach that focusses on a project manager being duty-bound to undertake pre-determined activities. He suggests adopting an Aristotelian perspective to encourage project managers to consider why they are undertaking specific tasks and duties and 'how they should act' in a given situation, rather than the current 'what should I do' approach (Bredillet, 2014).

Project Management Methods, Tools and Techniques

Project management methods, tools and techniques are intended to help the project manager do their job to attain project success (Besner and Hobbs, 2008). The distinction

between the three is that tools and techniques provide assistance with executing processes, whilst methods provide guidelines and checklists to ensure practices are being followed appropriately to attain the agreed benefits (Jugdev et al., 2013). In line with project definitions and knowledge, project management activities are often standardized by means of generic project management methodologies (Gunnarson et al., 2000). The standardization of project management methods, tools and techniques has been widely encouraged by organizations who view this as a way of rationalizing their efforts (Garel, 2013). These methods, tools, techniques, processes and knowledge have been developed primarily by practitioners who have sought to agree on best, or perhaps common, practices based on their experiences across a wide range of organizations and industries (Ahlemann et al., 2013; Garcia, 2005). The practice of managing projects has therefore become institutionalized and represents a collective understanding and identity for all project managers (Hällgren and Söderholm, 2012; Morris and Geraldi, 2011). Despite this institutionalization the standards have been criticized and questioned by the research community for 'blackboxing' knowledge. This criticism limits a more reflexive form of rationality and in turn the autonomy, creativity and discretion in organizations (Hodgson and Cicmil, 2007).

There are a wide range of project management methods, tools and techniques which are too broad to evaluate in this review. White and Fortune (2002) reported on 1210 methods, tools and techniques used by 955 project managers. Despite the proliferation of these project management methodologies there is little evidence of evaluating the appropriateness of standard approaches to integrate sustainability principles when managing projects. This is an important omission as the use of project management methods, tools and techniques can positively influence the integration of sustainability principles into projects (White and Fortune, 2002). The standardized approach in recent work has been to develop an overall sustainable project management methodology, model or process (White and Fortune,

2002). For example, Green Project Management (GreenPM) has been developed as a model to integrate sustainability throughout a project, and enable decisions that take into account the impact on the environment (Mochal and Krasnoff, 2013). Similarly, PRiSM (Projects integrating Sustainable Methods) is a process-based, structured methodology for managing change. The methodology highlights areas of sustainability and integrates them into the traditional core project phases to reduce negative environmental and social impacts in all project types. These project management methods are commercial in nature and relatively immature, and as such their effectiveness has yet to be established.

There are a wide range of tools that can be used to plan, implement and assess sustainability indicators. An example is the Life Cycle Assessment (LCA) which is an analytical tool that encourages and implements lifecycle thinking to derive environmental, economic and social impact indicators (Curran, 2004). When seeking to align project management objectives with sustainability principles a clear understanding of lifecycle implications must be established. Labuschagne and Brent (2005) suggest that in the manufacturing sector the full product lifecycle must be considered when planning a project. Maltzman and Shirley (2010) agree with this approach, pointing out that decisions made at the early stage of a projects inception will have sustainability implications beyond the end of the endeavor. Strategic management tools, such as the Balanced Scorecard (Kaplan and Norton, 1996), can assist in translating mission and vision statements into a comprehensive set of objectives and performance measures that can be quantified and appraised. It has been suggested that the Balanced Scorecard presents a promising starting-point to incorporate environmental and social aspects into the management of a firm (Figge et al., 2002; Kaplan and Norton, 2004; Länsiluoto and Järvenpää, 2010). The same approach can be applied in the temporary organization – the project, where the Balanced Scorecard may be used to evaluate projects from an economic, social, and environmental perspective (Sánchez, 2015).

Stakeholder management (PMI, 2017) is another area that has gained considerable attention from project management researchers and practitioners (Aaltonen, 2011; see for example: Eskerod and Huemann, 2013; Jepsen and Eskerod, 2009; Littau et al., 2010). Project management stakeholders can be defined as "the people and groups affected by the project or in a position to influence it" (Andersen, 2008, p. 81). From a sustainability perspective, effective collaboration with stakeholders is particularly critical (Hopkins et al., 2009) as many projects are complex, involve a large number of resources, and impact a wide range of stakeholders. To fully understand the issues relating to sustainability in project management it is necessary to understand the tensions and trades offs involved with all stakeholder groups (Martens and de Carvalho, 2016). Unfortunately, recent research suggests that stakeholder issues are treated superficially in the project management standards, and therefore require a paradigm shift in the values underpinning project management (Eskerod and Huemann, 2013). A shift from the current 'management *of* stakeholders' approach to a 'management *for* stakeholders' approach is advocated (Eskerod and Huemann, 2013). The application of these sustainability methodologies is perhaps more common in strategic and operational management than it is in project management.

Discussion

The literature review has identified five core areas where sustainability can be integrated into the management of projects. These core areas include: the definitions; managing project knowledge; project management success; project manager competencies; and project management methods, tools and techniques. There is a concern about the integration of sustainability and project management in these areas given the limited understanding of the sustainability dimensions and applications when managing projects. These five core areas are explored further to understand if an evolutionary or revolutionary approach may be required to challenge deeply embedded theoretical assumptions.

Project Management and Sustainability Definitions

It is clear that the project management discipline needs to adopt a consistent definition of sustainability to enable project managers to fully understand sustainability issues (Ebbesen and Hope, 2012). The literature shows that whilst the definition of a 'project' and 'project management' are well established, 'sustainability' is less so. As a result, the definition of 'sustainable project management' is unclear despite the combination of accepted definitions of 'project' and 'sustainably'. This confusion can be attributed to an apparent contradiction between a project being considered 'transient', 'temporary' and 'time constrained', when the core elements of sustainability are 'long term', 'future orientated' and measured against a 'triple bottom line' of current and future success criteria. This lack of alignment suggests a revolution of thought is required to develop a new paradigm of 'sustainable project management'.

Managing Project Knowledge

Managing project knowledge promotes good practice, minimizes rework and leads to the realization of sustainability benefits. However, there is a distinct lack of integration of the extensive project management BoKs with the principles of sustainable project management. Therefore, it is suggested the project management BoKs need a revolution to be re-written to include sustainability knowledge management.

Project Management Success

Despite efforts to broaden the scope and definition of project success traditional concepts dominate, indicating traditional paradigms have not changed. When reviewing the sustainability literature, success requires the harmonization of economic, social and environmental considerations. Whist the application of these three dimensions in organizations is clearly documented, integration in project management is less well

established. A number of authors have sought to integrate sustainability success criteria with project management success criteria, however no formal sustainable project management success criteria exists. A revolution in the way in which success criteria is defined, applied and understood when managing projects with sustainable outcomes is required.

Project Manager Competencies

A number of studies, and BoKs, have sought to define project management competencies, focusing on both hard skills, and softer people-oriented skills. Despite the literature confirming the importance of the project manager in the success or failure of sustainable project management outcomes, the BoKs do not contain any reference to sustainability competencies. The research presented by Ebbesen and Hope (2012) suggests that project managers are aware of the need to improve the understanding of sustainability and the longer-term impacts on projects. As Andersen (2016) suggests, perspectives on project management are bound to change over time. As this is a young discipline it will evolve to incorporate sustainability competencies, however the pace of change may be slow.

Project Management Methods, Tools and Techniques

Similar to the way project management competencies have evolved, project management methods, tools and techniques have been developed and refined over many years, predominantly by practitioners. Despite the various professional bodies formalizing these approaches, little has been done to evaluate the effectiveness of these tools in achieving sustainable project management outcomes. Practitioner groups have developed new methods, tools and techniques to be ‘sustainable’ or ‘green’ when managing projects; however, it is yet to be determined whether these approaches are effective and if they are being used by project managers. Due to this unknown adoption, sustainability approaches by the project management community may require an evolution to integrate the wide range of

sustainability methods, tools and techniques that already exist into the well-established project management approaches.

Conclusion

This paper set out to examine the impact of sustainability on project management methods, processes, practices and knowledge areas. To examine the current paradigms, a review of the literature was undertaken to develop a deeper understanding of the challenges faced by the project management community to move towards 'sustainable project management'. To identify the challenges, five themes were explored from a sustainable project management perspective to investigate: project management and sustainability definitions; managing project knowledge; project management success; project manager competence; and project management methods, tools and techniques. Following a review of the literature in these key areas from both a project management perspective and a sustainability perspective, the discussion has suggested where the integration of sustainability and project management is evolutionary or requires a more revolutionary approach due to the deeply embedded theoretical constraints.

The current definitions of 'project' and 'project management' need to be fundamentally revisited in order to reflect sustainability principles. In this respect, the definitions require a revolution of thought to develop a new paradigm of 'sustainable project management'.

Despite the fact that extensive knowledge as to the principles and practices of sustainability exist, it would appear that the project management bodies of knowledge need to be re-written to include sustainability knowledge management. As such project management knowledge requires a revolution in the way in which it is captured, recorded and disseminated.

Project management success does need a revolution to harmonize economic, social and environmental considerations of the triple bottom line. Here, future research may succeed by evaluating different ways for formulating sustainable project management success criteria.

Project manager competence remains a key challenge in regard to the long-term impact of managing projects *for* stakeholders to truly incorporate sustainability. However, perspectives on managing projects will change over time. As project management is a relatively 'young' discipline, practitioners will view the profession differently from when project management process, and the subsequent competencies, were originally conceived. Project management competencies are already beginning to evolve to incorporate sustainability, however the pace of change may be slower than many would like.

The project management practitioner community has already initiated a revolution in project management methods, tools and techniques through the development of new sustainability-focussed approaches. These approaches to managing projects may require a more evolutionary approach to integrate the wide range of sustainability methods, tools and techniques that already exist into the well-established project management methodologies and BoKs. Future research for the practice of managing projects could inform adopted practices through contextual indicators. It is expected that these practices are likely to extend the traditional project management paradigm.

The aim of this paper was to seek to understand through a project management lens the key areas of focus for the sustainable management of projects. Further research has been suggested to facilitate the generation of a new paradigm of managing projects, so current knowledge and understanding may evolve in order to fully incorporate the principles of sustainability.

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Figure 1

Project Management vs Sustainability (Hope, 2012; Silvius and Schipper, 2011)