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Design for sustainability and project management literature – a review

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Abstract

The growing pressure on natural resources and increasing global trade have made sustainability issues a prime area of concern for all businesses alike. The increased focus on sustainability has impacted the way projects are conceived, planned, executed and evaluated in industries. Since project management literature has hardly been considered in design for sustainability research, this article attempts to review the points of intersection between these two fields, and explores the potential that knowledge from project management literature has in improving efficiency and effectiveness of development and implementation of design for sustainability tools.

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Keywords: Design for sustainability; project management; product development; ecodesign

1. Introduction

The last few decades have witnessed increasing interest and attention for sustainability issues, and companies and industry branches around the globe increasingly see this as an opportunity to seize the potential business behind sustainability initiatives. Searching for ways to introduce and implement design for sustainability within industry has been one of the primary responses from the academia; and this has been mainly done in the form of method and tool development. However, research on the industrial state-of-the-art, both older [1]–[3] and more recent [4], [5], suggests that the application of these tools is marred by low degrees of implementation of design for sustainability (DfS) tools in "real life" industry [6].

An evident change brought about by the focus on sustainability is the change from product based systems to the product-service based systems [7]. Further, earlier works by Johansson [8] and van Hemel and Cramer [9] also highlight the need for internal stimuli in the form of innovation possibility, competence building within the company, customer relationship, management commitment etc. as some of the major success factors for successful integration of DfS in industry. More recently, Brones et al. [10] observe that these changes, among others, have necessitated research to explore the need for an overview of the various activities associated with DfS in the industry. Further, the need to have a holistic approach by considering various elements of design of sustainability as part of a single system has also been argued for in the environment friendly design context [11], [12]. The need to factor for increasing organisational complexities and importance of communication at different stages of eco-design product development [13], [14] also highlight the need for a project based approach to the topic of DfS. For the purpose of this research work, DfS is defined as the product design and development process with careful consideration of relevant aspects that can mitigate many environmental, societal and economic challenges during the life cycle of the product [15].

Stressing upon the need for project management in the sustainable development context, Labuschagne and Brent [16] observe that project management, being the "core business methodology" of most companies, cannot be excluded from the discussion on sustainability. It is in this context that this article explores the applicability and presence of project management focus in the existing DfS literature. Literature on project

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management practices and knowledge has been diverse and vivid. Among these academic works, the Project Management Body of Knowledge (PMBoK) issued by the Project Management Institute (PMI) has been widely used as the basis for various terminologies and guidelines in industries. Subsequently, this research work also uses PMBoK as a reference for the analysis on project management practices and terminologies. For the purpose of research and analysis, the following definition of project management from the PMBoK (4th Edition) is used:

"Project management is the application of knowledge, skill, tools and techniques to project activities to meet the project requirements".

Based on these constructs the following sections explore and present findings from literature on to what extent project management has been discussed in DfS literature and how it can help addressing the commonly faced challenges in DfS implementation.

2. Research Method

As the topics of DfS and project management are quite diverse, the study explores both topics in a two stage literature review method, as illustrated in Figure 1.

The two stage analysis was opted for, as it helped in providing a streamlined overview of the state-of-the art of both project management (PM) and design for sustainability (DfS) in relation to each other. The second stage analyses these findings to explore the insights and possibilities that can arise when PM is studied and applied to the DfS implementation process.

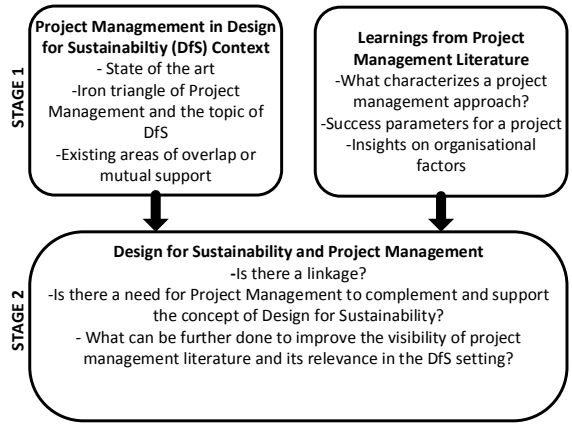

Figure 1 The two stage research model adopted for this paper

The findings from these two stages were then analysed in parallel to drive the discussions presented in the later sections of this article. A literature review on the topic intends to provide a comprehensive understanding of the existing academic research in the area [17], [18].

For streamlining the literature review process, two major databases were selected, namely, ISI Web of Science and Scopus. These selections were made mainly due to two reasons, the detailed meta-data available from these databases that facilitated supplementary research (1) and the relevance of design for sustainability literature in these databases (2). Literature review was carried out based on a wide ranging choice of terms and areas, such as 'project management', 'change management' 'project control', 'design for sustainability', 'eco-design', 'method', 'tool' etc. Section 3 presents the findings from the literature review, followed by discussion on the findings in section 4.

3. Results of the literature review

3.1. Stage 1: Design for sustainability and project management in each other's context

While there is abundant literature on both DfS and PM separately, there appears to be little research that builds on insights from both fields simultaneously. The exploratory research on articles dealing with both topics returned only 52 articles in ISI Web of Science, while Scopus search gave a list of 67 articles. On further applying filters and eliminating the same articles in both the databases, the list was shortened to 32.

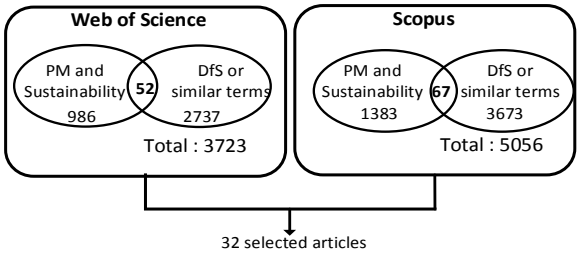

Figure 2 Literature search results in selected databases

The first part of stage 1 analysis looks into the project management literature to identify and highlight features from project management processes, organizational parameters and success factors that can augment and refine the DfS context. Project management literature is vast and addresses a multitude of issues pertaining to projects within organisations. However, as mentioned above, this section of analysis restricts itself to areas in project management literature that the authors believe are relevant in the DfS implementation context. For example, project management research on project success factors, impact of organisational diversities on project execution and managing these diversities, different processes in implementation stages of projects etc.

A wide range of project management literature identifies the three basic success factors for any project, namely, cost, time and quality [19], [20]. Known as the iron triangle, it evaluates how successful the project has been in achieving the stated quality within the budgeted cost and estimated time. But to arrive at this evaluation stage, a project passes through different processes. The Project Management Body of Knowledge (PMBoK) identifies five different processes that needs to be carried out simultaneously for swift information flow between various stakeholders of the project and to meet the overall project requirements. They are:

1. Initiating process group: The process group that define a new project or a new phase of the existing project by obtaining necessary authorization.