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ORIGINAL CONTRIBUTION

A Sustainable Integration Model (SIM) for Construction Project Management

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Abstract— Managing economic, social and environmental dimensions of sustainability in the operations of Construction Project Management is one of the significant tasks for today's managers. Because of its huge environmental impacts, The Construction industry emerges as an area of immense sustainable development. This led to an increase the focus of researchers and global communities towards incorporating sustainability in construction projects, and it changed the science of construction project management to a great extent. Yet, incorporating sustainability in projects is not a single time task rather a process whose scope is broadly distributed in all phases of construction projects, including planning, execution, delivery, and even till the lifecycle of project deliverables. Although project management and the concept of sustainability have been widely studied separately, how these two different fields act collectively and coordinate within the vibrant construction projects require more attention of researchers. In this paper Sustainability Integration Model (SIM) is presented based on a review of recent literature to define and incorporate sustainability in projects with a special focus on the construction industry.

Index Terms— Construction Industry, Sustainability, Project Management, Integration, Sustainable Project Management

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Introduction

The need for sustainability integration in construction is caused by a shortage of building material by the depletion of natural resources (Gautam et al., 2021) thus giving this industry a new discernment of Sustainable developments (De Azevedo, et al., 2020), but the intensity of sustainability integration in project management conferences and events is considerably low (Silvius, et., 2017) and thus requires a synthesis of the literature. The sustainable Construction intends to impact all three dimensions of sustainability i.e., economic, social and environmental, in the milieu of the whole community (Kibert, 2008). The large scope and increased resource constraints has made Sustainable Project Management as a matter of inordinate attention for the Construction Manager (Silvius and Schipper, 2020). The Proliferation in the number of involved stakeholders and balancing environmental, social, and economic requirements has further added up insignificance of sustainability under the context of project management (Banihashemi, et al., 2017). Therefore, researchers highlighted the need of doing business while dealing with environmental and social concerns along with economic targets; it requires integration of sustainability with its all three (economic, social and environmental) constituents into practices of project management especially, in the construction industry.

This need for integration in construction projects leads to more detailed probe as requirements of sustainability affects both project goals and the process through which these goals are planned to achieve (Marcelino et al., 2015). For large projects of construction- achieving sustainability-related objectives requires optimal allocation of resources along with stringent planning to tackle various challenges

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(Sfakianaki, 2015). As these large projects produce an enormous amount of waste, that is hazardous, flammable and causing risks to environmental health (Ahmad et al., 2021). The involvement of various stakeholders, long durations, and large social and environmental impacts (Marrewijk et al., 2008) of construction projects is highly complex. Thus, creating an immense need to integrate sustainability into project management to match project deliverables (Kivila et al., 2017) with sustainability components.

One of the potential areas of practical, sustainable project management is to a manage construction projects to achieve goals of Sustainability (Silvius and Schipper, 2014). The research suggests that the focus of sustainable project management is to plan, monitor, and control the project delivery process in a way to make it deal with issues of sustainability according to social, economic, and environmental aspects (Marcelino-Sádaba et al., 2015). While the term integration refers to integrating sustainability into practices of the project; a way of doing business rather than a separate entity (Banihashemi et al., 2017). Under the context of project management, sustainability is getting vast attention due to an increase in the number of resource constraints with the requirement of balancing with social, environmental and, economic objectives (Martens & Carvalho, 2017).

Yet, incorporating Sustainability in Construction projects is not always an easy task to do because it challenges the project outputs. It is indispensable to review literature so advancements could have been made after readers have an original idea about the body of research done up till now about sustainable construction project management. There are privations in the literature about the method with the help of which sustainability can integrate into project management. But how this knowledge of sustainability can integrate into Construction industry is the enquiry aimed to resolve by this study. It has been noted that Project management and the concept of sustainability have been extensively studied distinctly but how these arenas turn communally and coordinate within the vibrant construction projects necessitates more attention of researchers. It is clear that by the term sustainable project management, we mean to apprehend the importance of sustainability-related objectives during managing construction projects. The drive to do this paper is to scrutinize the conception of sustainability generally and build fundamentals to integrate this notion within the sphere of Project management in the construction industry based on literature published in reliable journals.

Methodology

A Review of recent literature and classical papers is made to explore the body of knowledge about sustainability integration in construction projects. The tenacity of this research paper is to do a critical evaluation and synthesis of studies about the expanse of the sustainability and its incorporation into the construction industry by a holistic approach. Solicitation of broader search criteria allows exploring a body of knowledge where the reader could apprehend the concept of sustainability and its dimensions and manage projects to alleviate profitability and sustainable developments.

The aims of this paper are achieved by using the research strategy of a systematic literature review. A Systematic Literature Review (SLR) holds its position as a valuable technique to reveal gaps and patterns established in published research studies (Sengers et al., 2019). This review is composed of scholarly articles from numerous databases with the search criteria based on these itemized parameters: research papers published in the English language, with particular focus on recent publications and the inclusion of classic pieces that relate to the selected research domain. Therefore, it produces a significant development while creating a noticeable impact on the body of knowledge. With the help of prior knowledge on sustainability and project management, efforts are made to review the earlier literature to develop a storyline for readers, starting from explaining sustainability with its dimensions, the literature of sustainable construction is explored to build grounds, and in the end, literature related to Sustainable Construction projects is reviewed. In detail, the study is necessary as construction proves to be a challenging sector for implementing stringent policies regarding sustainability because of its vibrant project nature.

The first stage strategy of an eclectic range is employed by searching the key terms of "Sustainability" and "Construction Project Management" in full-text resources of online databases. These databases are selected centered on their usage by researchers of Business and Social sciences in preceding literature reviews. Later these papers are sieved with the specified perspective of the Construction Industry, with a particular publication date. The reason for doing this is to filter out those research papers that were published not before a decade, as the aim was to collect current knowledge regarding sustainability and its assimilation in Construction Project Management. Thus, an updated version of the literature review is formed to contribute to the body of knowledge. Majorly 70 research papers are considered essential to building a review on sustainability integration in construction project management. There are four main sections of the literature review. Section 1 explains why it is crucial to study sustainability in the Construction industry. After well-establishing importance- the concept of Sustainable Construction is explored in Section 2. Section 3 focuses on the primary purpose of the study, i.e., integration of sustainability in construction projects and future directions, along with the conclusion is done in section 4 as shown in Fig 1.

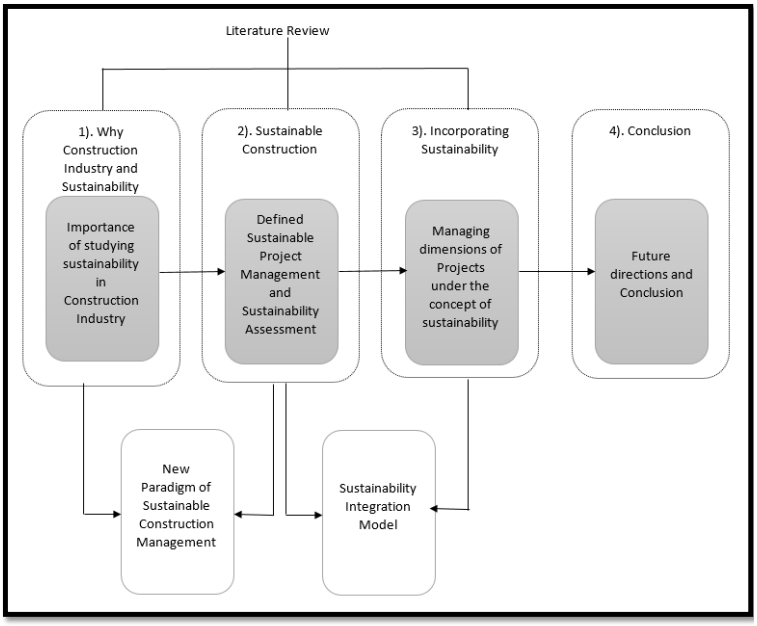

Fig. 1. Illustration of the review study

Construction Project Management

The construction industry plays a positive role in the economic progression of developing countries. This contribution of the Construction industry towards the economy is highly significant because of its multiplier effects both directly and indirectly. The advancement of this sector also boosts other connecting industries. Building infrastructure and shelter, increasing employment, and domestic construction are some of the contributions, especially in countries that experience rapid developments in urbanization and industrialization. Along with benefits associated with progressing construction industry generation of solid wastes, air and noise pollutions are some of the most discussed hazards caused by it (Heravi et al., 2017). So, despite its prominence, the wastage generation and consumption of natural resources by construction operations are an imperative field to study.

The construction industry provides a unique environment; for improving project management proficiencies. Because the Construction industry maintains its high impact position due to its dynamic project nature, it leads to extraordinary variability compared to other sectors, thus fabricating a dearth of standard procedures and practices to run operations (Marcelino-Sádaba et al., 2015). The prominence of project management for construction industry success is a well-established fact. In today's world of qualms that also face the intimidation of scarcity of resources, the need to review sustainability under project management becomes an absolute dominion of research.

A project predominantly depends on the process and its objectives through which it is delivered (Marcelino-Sádaba et al., 2015). The convolution of integrating sustainability is relatively more significant as construction projects upsurge because it requires optimal apportionment of resources and managing austere schedules and the aims of achieving Sustainability (Sfakianaki, 2015), as shown in Fig 2. Another intricacy associated with the construction industry is that its projects are indeterminate and multifaceted because long durations are required to complete and, over time number of stakeholders increases this also; leads to rising barricades while ensuring sustainability in projects (Chang et al., 2016).

In the literature available, construction project management was studied concerning precarious success dynamics like cost, schedule, and planning, while others studied project management, by focusing on its processes. Perilous success factors like project control and portfolio management are studied sustainability within project management (Kivilä et al., 2017), as it's these factors that determine the success of the project (Siew, 2016). It is studied that out of all phases of project management, it's the project planning that needs to give special attention to bring sustainability during the whole life of the project. As it's the phase of project planning in which all discerning process takes place to set and achieve targets at the culmination of a project- and this is done by efficient allocation of resources. Project planning occurs both at the internal and external sides of the project and at all organizational levels. It also acknowledges how stakeholders' requirements could be fulfilled (Kivilä et al., 2017).

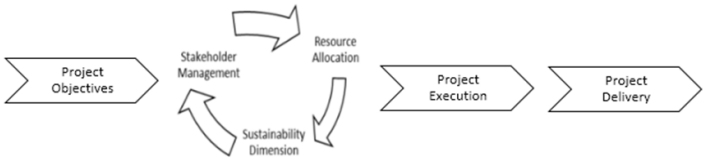

Fig. 2. Project delivery process

Sustainable Construction Project Management

One of the impending areas for incorporating sustainability in construction project management is its practical implementation. The contemporary researchers focus on controlling and delivering projects in such a way that the whole process would be able to face challenges linked to sustainability in the context of social, economic, and environmental protection; not only during the erection phase instead throughout the life cycle of constructed entity (Sfakianaki, 2015). It has also been discerned that integrating sustainability into project management has an uninterrupted impact on engineering projects objectives such as stakeholder's demands, cost, schedules, and resource allocation (Hamilton & Gibson, 1996). Therefore, it is indispensable to plan accordingly in the planning phase to integrate sustainability in project management (Aarseth et al., 2017). Some certain studies evaluated the projects on the fundamentals built by project planning but, also convolute some non-validated questions. One must admit that although researchers and engineers are working hard to accentuate the prominence of planning, still it's an unexplored area that what would be an appropriate amount of effort required for planning to achieve an optimal level of Sustainability (Boz and El-adaway, 2014). Thus, it becomes clear that by integrating sustainability and highlighting project management's role, it is indispensable to define sustainable construction project management clearly. It is essential to incorporate sustainability in project management by balancing economic, social, and environmental objectives and interests of stakeholders, and the goals of a project. These insights from literature created a new paradigm for project managers in which they have the errands of managing projects to meet the challenges of profitability, uncertainties and, scarcity of resources, while trying to optimize economic, social, and environmental aspects of sustainability as well. This new paradigm is illustrated in Fig 3.

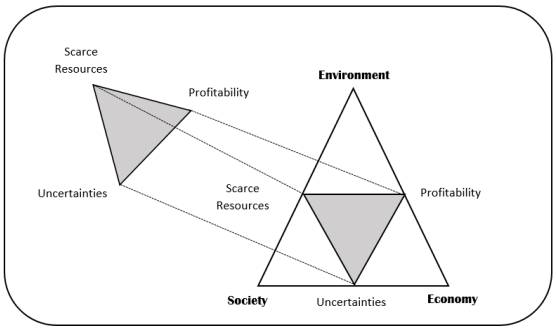

Fig. 3. The new paradigm of sustainable construction Management

Sustainable project management necessitates the equilibrium between economic, social, and environmental benefits and the input of resources (Yang et al., 2017). The construction projects can be beneficial today, but they can be treacherous in future scenarios and affect many stakeholders' interests. So it is the social, economic, and environmental impact that a construction project produces, which ranks it good or bad to be a sustainable project. Therefore, researchers point out that sustainable project management uses rational and should pay attention to saving the resources for future generations and thus being responsible on social, economic, and environmental grounds (Kleindorfer et al., 2005). The proper use of resources is essential for sustainable construction projects, and in the end, these are evaluated on the criteria of being socially, economically, and environmentally protective.

The problem to be resolute is that there is a difference between project success and project management success, which leads to some trade-offs for project managers (Tinoco et al., 2016). Sustainability is a broader arena that chaperons project managers to plan to manage and control the apportioned resources while considering their social, economic, and environmental impacts not only during the life of the project but also during the life of whole assets produced. The decisions made by construction project managers should be according to the client's interest. These should also correlate with social, economic, and environmental wellbeing's sustainability objectives (AGS14). Because of this reason, projects that use an excessive number of resources and whose projects product could have effects on social, economic, and environmental aspects- should have a sustainable approach. The classified contributions of the authors are summarized in Table I.

Table I
Literature summary

Researches	Year	Sustainability Integration		Sustainability Dimension		Sustainable Constructions		
		Project Performance	Resource Management	Importance	Assessment	Importance	Assessment	Tools Formulation
Silvius A. and Graaf	2019	✓						
Morsing, Oswald, and Stormer	2019	✓						
Zou, Duan, and Deng	2019	✓	✓					
Martens and Carvalho	2017		✓					
Banihashemi, et al.,	2017		✓					
Kivilä, Martinsuo, and Vuorinen	2017		✓					
Aarseth, et al.,	2017	✓						
Siew,	2016	✓						
Chang, et al.,	2016	✓	✓					
Marcelino-Sádaba, González-Jaen, and Pérez-Ezcurdia	2015	✓						
Marcelino-Sádaba, González-Jaen, and Pérez-Ezcurdia	2015	✓						
Sfakianaki	2015		✓					
Boz and El-adaway	2014		✓					
Eskerod and Huemann	2013	✓						
Labuschagne, Brent, and Erck,	2005	✓						
Tarne, Lehmann, and Finkbeiner	2019				✓			
Castroa, Pinillab, and Mantillac,	2019				✓			
Yang, Xu, and Shi	2017			✓				
Tinoco, Sato, and Hasan	2016			✓				
Tan, Shen, and Yao	2011			✓				
Mu, Feng, and Chu,	2011			✓	✓			
Silvius and Schipper	2014			✓				
Kleindorfer, Singhal, and Wassenhove,	2005			✓				
Li, et al.,	2018					✓		
Heravi, Fathi, and Faeghi	2017							✓
Perini and Rosasco,	2016					✓		
Zhong and Wu,	2015					✓		✓
Refahi and Talkhabi,	2015							✓
Zhao, et al.,	2015					✓	✓	
Asdrubali, Baldassarri, and Fthenakis	2013						✓	
Yao et al.,	2011						✓	✓
Piluso, et al.,	2010						✓	
Huberman and Pearlmutter,	2008					✓		
Ugwu and Haupt,	2007					✓	✓	
Khalfan,	2006							✓

In literature, sustainability in construction projects is studied by integrating economic, social, and environmental objectives within the project's success. Still, this does not provide a holistic view to fathom sustainability for project management. Because the three-dimensional approach is related to the strategic point of view and, these strategic standpoints of construction projects can vary from

project to project. Furthermore, the verdicts related to sustainability must need to be address at all junctures of a project in the context of customers, resources, society and environment (Zainul-Abidin, 2008). These decisions should focus on the conservation of resources and the benefits achieved by them (Habibi et al., 2018). Authors studied decision-making facets from the angle of green Construction (Hwang & Ng, 2013). It is noticed that the decision-making process is highly affected by environmentalists and social workers (Aaltonen & Kujala, 2010). The following are some considerations rendered necessary by many researchers to integrate Sustainability within Construction projects.

Life cycle of construction project

Sustainability orientation of project management is extensively debated by many researchers (Silvius and Schipper, 2014). Out of each stage, it is the planning phase that is crucial for achieving Sustainability (Kolltveit and Gronhaug, 2004). As in this phase, planning considers the usage of resources. But the orientation discussed holds precincts for short-term projects. It is the constructed product that correlates with a project's life cycle, so the project's life cycle and product's life cycle need to be considered while studying sustainability in projects (Labuschagne et al., 2005). Overall, the project's lifecycle, project's products, and project's process are considered collectively to evaluate sustainability within the domain of project management (Silvius and Schipper, 2014). The effects of projects on the environment are significant and need to study deeply (Brent and Petrick, 2007) and premeditated by various researchers (Heuberger et al., 2007).

Level of construction project

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Level of construction project

In today's global world, gains and losses are pressing concerns for economies, so is the case with sustainability. The economies are more concerned with the effects of sustainability on all levels, i.e., local, regional, and international levels, as it's the project's that is important while studying the effects of Sustainability (Edum-Fotwe & Price, 2009). Because in projects, it's the stakeholders involved at a global level like customers, vendors, partners, etc. (Silvius and Schipper, 2014). While considering the impact of international business, it is important to note that it can include the supply of materials and resources for projects located at different sites nationally and internationally (Cleland and Gareis, 2006). So for studying sustainability, one must take notice of the level of the construction project.

Policies and social concerns

The construction company should make policies acquiescently as per considering the social concerns and identify the ways to tackle day-to-day issues as the company's decisions will sway nature and society (International Organization for Standardization, 2010). It implies that the company is answerable towards its policies and regulations and should consider itself responsible for the impact made by its decisions on all stakeholders involved, like clients, society, and the environment. The open policy formulation procedures imply that all information regarding the company's policies and actions can reach timely to all stakeholders to measure the influence of these policies on time and proactively get ready to tackle and report if organizational operations foresee any hazard. So, sustainability is incorporated within the company's operations and decision-making process. Thus, it's the open communication between the company and stakeholders that helps in achieving sustainability among projects as the impact of projects on participants, society, and environment are timely coordinated (Silvius et al., 2012), both in the long- and short-term durations (Khalfan, 2006).

Further researchers also highlight that projects should be completed while considering social values. Many studies show that scholar renders social and ethical values as an essential concern to study sustainability within projects (Eskerod and Huemann, 2013).

Managing stakeholders and uncertainty

From the construction project management point of view, managing indecision and stakeholders are very pressing concerns. According to a sustainable project management perspective, the participation and involvement of stakeholders are critical. The consideration of stakeholders' interest in bilateral communication between the company and participating parties leads to stakeholder management (AGS14). It is the job of project managers to endorse stakeholders' involvement in project-related decisions and policy formulation (Silvius and Schipper, 2014). Developing communal agenda in two-way communication is the elementary goal of stakeholder management. These are the genuine parties who can ascertain a problematic area and develop synthesis to deal with the highlighted issue related to Sustainability (Goedknegt and Silvius, 2012). The involvement of stakeholders in the project-related decision-making process is one of the basic requirements of sustainable project management (Eskerod and Huemann, 2013).

Furthermore, the most common concern to manage in Construction projects is uncertainty because few uncertain events can reduce the profitability and efficiency of projects. Uncertainties related to finances, resources, and materials should be comprehensively dealt with during the projects' execution phase to achieve sustainability. (Winnall, 2013). Project managers are required to develop Anticipatory and precautionary methods to manage uncertainties (Silvius, 2016). As the nature of construction projects is dynamic and irreversible, it is always acclaimed to prevent such uncertainties compared to finding ways to solve them (Makui et al., 2010). However, the management of Construction Projects cannot predict the possible outcomes of uncertain situations, and they can only take restricted actions to deal with such uncertainties (Kerzner, 2010). It has been evident that the impacts of risks related to uncertainties can be huge on a project's objectives (Bakker et al., 2010). So, in sustainable project management, managing uncertainties and risks is highly significant (Turner, 2016). The prior evaluation of predicted events can help in proactive preparation to avoid the risks and negative impacts of these uncertainties. (Turner, 2016). The efficient management of uncertainties and stakeholders improves the project's productivity as a whole and helps in managing resources and improving the quality of product delivered.

Wastage management and efficient use of resources

The eradication of waste is vital to ensure a continual supply of resources (Maltzman and Shirley, 2013). But it is difficult to calculate the exact quantity of Manure in construction projects. In project management, changes in plans, poor logistic activities, inaccurate estimation of resources, poor communication, and inadequate supply standards can lead to wastage generation. In this scenario, organizations should learn from their previous losses caused by waste and develop strategies not to encounter such techniques in the future (Eid, 2009).

The efficient use of resources can be one way of reducing waste at construction project sites. But it must be kept in mind that competition to do business forces organizations to use natural and human resources. This overuse of resources leads to creating a threat to overall sustainability. The pressure to work within given timelines and execute efficiently on projects may cause mental stress and tension-related problems in employees (Brink, 2013). The Organizations should consider sustainability perspectives in making targets about the supply of materials. Based on the literature studied, it is made clear that by setting sustainability and other milestones of construction projects in the Project management domain, the integrated area of sustainable project management can be flourished, as shown in Fig 4.

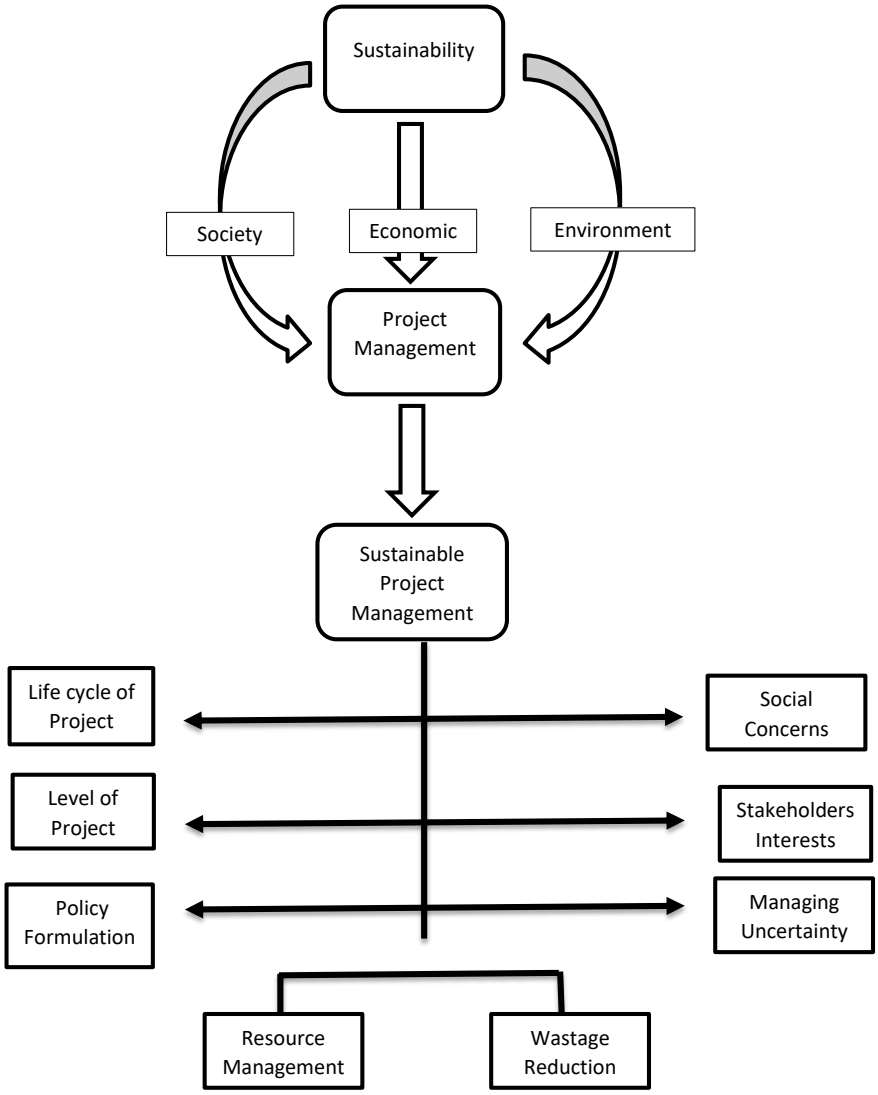

Fig. 4. Sustainable integration model (SIM)

Sustainability assessment

Sustainability assessment is the first step in developing sustainable advances (Piluso et al., 2010). One way to assess the sustainability process and the product's whole life is Life Cycle Assessment (Zhang et al., 2013). As the hazards of resource diminution and environmental problems are increasing, Life Cycle Assessment has been increasingly used to aid decision-making related to sustainable construction (Asdrubali et al., 2013).

To assess the sustainability of construction products, various tools are in use; out of which the following are some dominating ones:

- Leadership in Energy and Environmental Design rating system, U.S. (LEED)
- Comprehensive Assessment System for Building Environmental Efficiency, Japan (CASBEE)
- Green Star (Australia)
- Building Research Establishment Environmental Assessment Method, U.K (BREEAM)
- Italian ACcelerometric Archive (ITACA)

These tools are used to assess the environmental impacts of construction buildings (Zhong and Wu, 2015). In literature, Sustainable Construction is available from the context of its environmental impacts, e.g., efficiency in resource utilization (Kauffman, 2011) and also from its social and economic effects (Refahi and Talkhabi, 2015). The social impacts of buildings include residents' comforts and approachability to public and urban facilities (Zhao et al., 2015). In comparison, the economic benefits included cost aids during the

life cycle of building (Perini and Rosasco, 2016). One of the most comprehensive models assesses construction sustainability by social, economic, environmental impacts, resource utilization, project management and safety benefits, and health protection (Ugwu and Haupt, 2007). Furthermore, researchers assess sustainability using a simulation model (Yao et al., 2011) and the Sustainability of other types of setups like Energy; and infrastructure of transportation (Brown and Sovacool, 2007). In Fig 5, it is explained objectively how dimensions of sustainability can be measured according to academic researchers in previous studies.

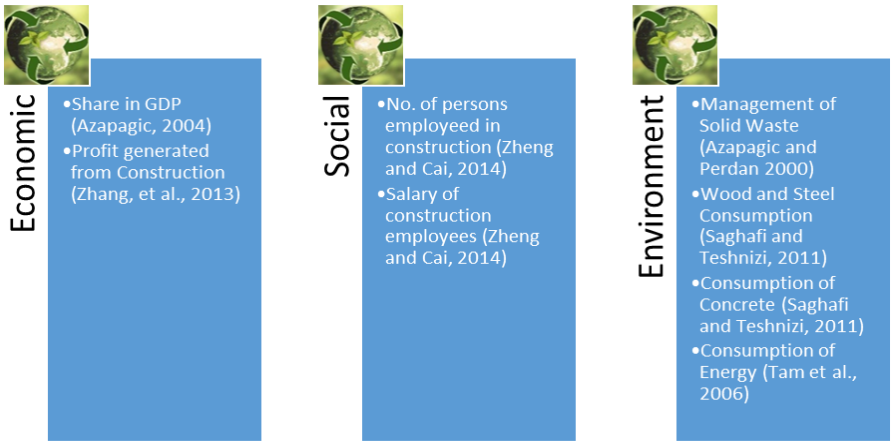

Fig. 5. Measures to gauge sustainability dimensions

Construction phases may also incorporate sustainability assessment. Majorly there are two phases of construction; the operation and construction phases, which have significant environmental impacts. The operation stage has 80-90% impacts on the life cycle, and the construction phase accounts for 8-20% impacts (Huberman and Pearlmutter, 2008). Both the phases are not mutually exclusive; instead, most project management goals imply different weightage presented in Figure 6. This enormous impact of the operation stage consumes almost 98% of the total product's life cycle energy for processes like ventilating, heating, and functioning of different electrical appliances (Zhang et al, 2015).

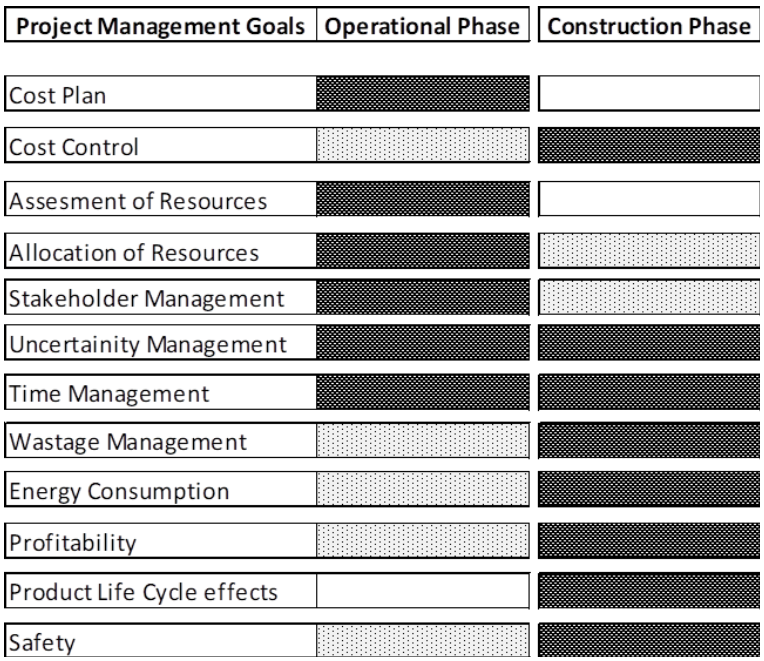

Fig. 6. Weightage of project management Goals

Future Directions

Sustainability can be achieved in Construction projects only if decision-makers and policy formulators cognize the importance of managing sustainability. It's the company's human resources that makes policies and implements those policies. The appropriate coordination among staff members at all levels, i.e., top management, middle management, and lower management, can lead towards achieving sustainability objectives set at the start of the construction project. Meanwhile, monitoring and controlling are required at each stage of project execution to ensure sustainability by managing resources and eradicating such business operations, which may cause harm to sustainability goals and are not crucial to business objectives (Kivila et al., 2017). Literature review advocates the limited availability of accepted Sustainable project management practices (Aarseth et al., 2017). The sustainability in construction projects mostly defined as the process or efforts made to meet present necessities without damaging the future resources available for the next generation (Keeble, 1988). After analyzing and studying literature broadly, we can say that there are three classifications of sustainability dimensions, and these three are highly significant compared to each other. In the earlier days of sustainability concept evaluation, only financial growth was considered important. Later on, social concerns and environmental concerns gained importance, and a triple-bottom-line methodology was formed (Elkington, 1994). In today's dynamic world, the focus of project managers is on generating innovative products along with profit generations and achieving project goals (Martinsuo and Killen, 2014). The Construction Project managers have to incorporate goals related to sustainability as critical success factors of their performance along with cost management and on-time completion of projects.

Similarly, to meet stakeholders' expectations, incorporating sustainability within projects is vital and can be done with the help of various methods available (Orouji, 2016). Literature suggests that the construction project delivery and construction project execution should be considered to develop a holistic view of sustainability throughout the project's lifecycle. This leads to new future considerations for researchers to study sustainable approaches within construction projects, including project planning, execution and delivery, and project control and monitoring. Gaps are observed in models (Bebbington et al., 2007), processes (Singh et al., 2009), and tools (Hartmann, 1998). There is also a need to develop methods to monitor and develop parameters that can measure sustainability within projects (Labuschagne et al., 2005).

Conclusion

In the current study, a literature review is done on sustainability and integration into construction projects, in which the primary focus was not more than a decade ago. The recent research concerning the importance of sustainability in project management, especially in construction, would be a helping hand for construction project managers to take sustainability-related decisions. Sustainable Project Management Integration Framework directs Construction managers about the flow of activities that renders sustainable approach in the field of Project Management. These decisions range from strategic to operational level and are supported by Multiple criteria decision-making theories (MCDM) (Zavadskas et al., 2018). In this paper, researchers' contributions and the methods to implement sustainability and tools based explicitly on the Life-Cycle assessment methodology are highlighted to evaluate sustainability-related activities. From the review of literature, new dimensions related to the integration of sustainability in project management for analysis and research has been found as:

- There is a strong need to develop assessment tools other than LCA, Eco-Labelling, and Environment Management Systems to manage resources and define the exceptional sustainability level among projects. Contractors are usually afraid to completely implement sustainable construction practices due to the possibility of increased costs and limitations. Therefore, the contract award and environmental requirements criteria need to integrate into diverse assessment methodology.
- To incorporate dimensions of sustainability, i.e., environmental protection, social wellbeing, and economic prosperity, should integrate among objectives of construction projects, and project managers can estimate requirements related to these parameters in the planning phase to reduce uncertainty.

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