

Stakeholder integration in management of sustainable construction: A literature review

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Abstract:

Construction is highly fragmented across multiple stakeholder expectations. Studies focusing on stakeholder integration (SI) in managing sustainable construction are still fragmentally evolving as well, hence the need to conduct a systematic literature review on SI across management of planning, design, construction, maintenance and demolition in the last 20years to identify the current trend and realistic management strategy. This study is segmented into two categories, pre-2015 (from 2002 - 2015) and post-2015 (2015 - 2022) era. Studies reveal that SI in Sustainable construction discussions are directly proportional to economic and environmental challenges. Conclusively, this study recognises complete SI across all management processes as sustainable management strategy for sustainable construction. It also provides direction to both policy makers and researchers on SI in sustainable construction.

Keywords:

Stakeholder integration, sustainable management strategy, sustainable construction, stakeholder management, construction management

1 Introduction

Construction is characterised by lack of effective decision making, communication, legal system, corporate malfeasance, inconsistent policies and inadequate support from established institutions, stakeholder integration which ought to be the catalyst in driving behaviours and performance (Danso et al 2020). This is not happening because it lacks true alliance as acknowledged by Vilasini et al (2012), because only a part of the value chain (owner, designer, main contractor) is still considered for integration. Stakeholder integration (SI) is the partnership where organisational and project stakeholders such as customers, communities, suppliers of materials and services inform organisational practice and project management to deliver all round improved performance (Amankwah-Amoah et al 2018;). According to Danso et al (2020) SI is collaboration of interested parties to inform both organisational and project practices to deliver improved sustainable construction (SC), which has become a fundamental part of organisational and project operations. Although Li et al (2010) recorded growth in theoretical and empirical interest on stakeholder integration, the understanding of how it relates to sustainability performance in construction is still limited (Danso et al 2020). As a result, we seek to address this limitation by reviewing the existing studies from 2002 to 2022 and hence track the relationship between SI and sustainable construction.

2 Stakeholder Integration in Planning and Design

Planning and design are part of the earliest stages in construction delivery. Aarseth et al (2016) refer to planning and design as directions and strategies towards achieving sustainable construction. Emphasizing sustainability at project planning and design is strategic for a sustainable construction (Abidin and Pasquire, 2007). Interestingly, project planning and design is not a linear process because it mostly involves iterations, sometimes with unavoidable repetitions or reworks (Kpamma and Adjei-Kumi 2011). This explains why the top ten extreme significant causes of design challenges identified by Sha'ar et al (2017) which are 'delaying the approval of completed tasks', 'lack of proper coordination between various disciplines of the design team', 'lack of specialised quality-control team', 'lack of skilled and experienced human resources in the design firms', 'unstable client requirements', 'awarding the contract to the lowest price regardless of the quality of services', 'lack of skilled human resources at the construction site', 'delaying of dues payments', 'lack of professional construction management' and 'deficient drawings and specifications'. These challenges are not new as Anumba et al (2002) had declared that multi-agent system (SI) which stimulates and demonstrates interaction, communication and negotiation amongst different stakeholders is critical for a collaborative design. Nonetheless, quality management which is boosted through SI, is very significant in planning and design of sustainable construction. Therefore, Keenan and Rostami (2021) proposed superior managerial control, recording and reduction in defects are immediate improvements in sustainable construction when implementing any quality management system. Hence, Solaimani and Sedighi (2020) promotes the adoption of last planner systems (LPS) inspired by lean philosophy, which emphasis what "can" be done instead of what "should" be done. Nevertheless, not integrating information technology at the early phase of project planning and design was flagged as a challenge by Le et al (2020), the scholars recommended collaborative planning and design plus using Building Information Modelling (BIM) and lean construction. Countries are adopting these practices across the world. In Norway for instance, Aarseth et al (2016) revealed that sustainable construction requires policies for "robust" planning and detailed design construction. Robust in their context implies completeness or integrated approach to development (Ebohon et al. 2020).

3 Stakeholder Integration in Construction and Maintenance

Post project planning and design, identifying key factors to management strategy is critical to sustainable construction (Solaimani and Sedighi 2020). El-Sawalhi and Hammad (2015) referred to stakeholders as the major cause of uncertainty in construction management. While, Sha'ar et al (2017) identify stakeholders (interface) management as a key success factor in sustainable construction. This was demonstrated in Shanghai World Expo 2010 by Shi et al (2012). And Ross et al (2010) reviewed seven sustainable principles; maximise resource reuse, use renewable, recyclable or recycled resources, protect the natural environment, minimise resource consumption, pursue quality in built environment, create a healthy, non-toxic environment and promote socio-economic uplifting. In the United States of America, Haupt and Whiteman (2003) recommended the implementation of Total Quality Management which encourages constant feedbacks across all stakeholders in construction, and

emphasised the development of managers' competencies in this regard. Chileshe and Kikwasi (2014) had acknowledged the significance of competencies in risk assessment and management practices for sustainability in Tanzania construction industry. Focusing on sustainable management capacity, Hamza et al (2019) highlight the importance of project manager's skills and competencies development for the success of sustainable construction, with Onyia et al (2021) emphatic about digitalisation of the construction management skills and competencies. Although Le et al (2019) believe that BIM systems' moderate supports to operational and tactical issues like process standardisation, problem-solving, and information sharing can be advanced in Canadian construction. However, within the last decade, there has been a surge in the automation and digitalisation of construction management processes throughout the lifecycle of projects, featuring smart robotics, augmented reality (AR), cloud virtual (VR), Artificial Intelligence of Things (AI), 4D printing, blockchain and digital twins (Pan and Zhang 2021). Remote, virtual and visual management is another practice that is effective in managing and stimulating stakeholder integration (Kasiramkumar and Indhu, 2016; Onyia et al 2021). These have positive impact on self or team management, monitoring, control, and workplace conditions, performance (Onyia et al 2021) and safety (Windapo, 2013; Nahmens and Ikuma, 2012).

Furthermore, encouraging a culture of integration, co-operation and teamwork, were proven by Keenan and Rostami (2021) to increase construction performance as time progresses. Interesting cultural challenge to implementation of integration, co-operative and sustainable management in Africa has been flagged by Dansoh et al (2020)'s confirmation of the influences of traditional authorities and communities on infrastructural development in Ghana. This collaborates Ugwu and Haupt (2005) recommendation that integrating local stakeholders must be part of the overall sustainable construction in developing countries. Tchumtcha (2021) described Chinese project management strategy as unsustainable in Africa, because its disregards the integration of community-based stakeholders. The study revealed that contrary to the perception that the Chinese project management style is relationship oriented, informal or "Guanxi" as applicable outside Africa, it is rather strictly formal, contractual and exclusive in Africa. And the secrecy breeds corruption and dissatisfaction amongst stakeholders. This is contrary to established stakeholder management guidelines and regulations widely acceptable even in China as demonstrated during Shanghai World Expo 2010 (Shi et al 2012). In Brazil, Monteiro et al (2020) suggest structural management change which promotes integration and transparency to mitigate corruption in sustainable construction. Lawani and Moore (2021) insist that since sustainability deals with diverse individual behaviour of stakeholders, emotional intelligence (EI) is critical in enhancing the performance of SC. EI is a contentious issue in construction industry, due to the claimed characteristics of the industry, which include; aggressive/authoritative management styles (Giritli and Oraz 2004) like the Chinese project management style (Tchumtcha 2021); male dominated culture; transient workforce; transactional relationships (Loosemore and Galea 2008); and fierce competition (Dainty et al. 2002). These perceptions of the construction industry are believed to emanate from early scientific management systems which were independent, impersonal and instruments of rationalisation with no place for emotions (Hancock and Tyler 2009) and does not meet the collective objectives of the stakeholders and hence not sustainable.

3 Research Methodology

The study is based on a systematic literature review method to achieve our research objectives. A superior literature review method, especially in terms of transparency and replicability (Aarseth et al 2016). It is also a very familiar research methodology which was recently modelled by Chan et al (2020). Publications of between 2002 and 2022 from six (6) renowned journals of architecture, engineering, and construction areas in three comprehensive databases Google Scholar, SCOPUS, Web of Science were searched, filtered, evaluated and interesting publications were thoroughly investigated. The selection of these three databases was based on their output quantity and influence factors (Utama et al 2017).

The key words such as *stakeholder integration for sustainable construction* were adopted as a set of search code. Try-error combination with words like *stakeholder management, stakeholder engagement, sustainability* or *sustainable infrastructure* were also used to narrow the search focus. A content analysis technique instead of meta-analysis was ascertained as an appropriate approach to establish this outcome (Utama et al 2017). Elo and Kyngas (2008) validated to content analysis as a flexible approach to document analysis. Identification of the substantive interest and determination of type of content analysis are the steps recommended by Fellows and Liu (2008) for undertaking a content analysis. The qualitative content analysis was carried out in this study by conducting an in-depth study of the journal articles' content. Quality content analysis tends to analyse the paper content, then methodically coded and grouped based on topics (Hsieh and Shannon 2005).

3.1 Papers retrieval and selection

For a high level of methodological robustness and to access substantial and credible publications for this study, 6 top construction management journals with average scores above 60% as recommended by Chan and Owusu (2017) as endorsed by Tetteh et al (2020). Virtual Libraries (VLs) were used to retrieve journal papers in order to build a dataset of articles upon which to conduct the systematic analysis of this study. The keywords searched are “stakeholder integration” for “sustainable construction” or “sustainable infrastructure”.

As shown on Figure 1, the search results returned 158 publications. Please note that we identified publications where our searched words featured in the record title, abstract, or keywords. Papers were selected through search engines like Google Scholar, Web of Science and SCOPUS. 24 of these relevant papers were retrieved and selected from International Journal of Construction Management (IJCM), 14 papers from Construction Management and Economics (CME), 7 from Journal of Engineering, Design and Technology (JEDT), 5 from Automation in Construction, 5 from Journal of Cleaner Production, 2 from International Journal of Project Management (IJPM) and 20 from other journals. These 77 selected were peer-reviewed papers. Past research papers (Tetteh et al., 2020; Darko and Chan, 2016) in construction management were reviewed using the study objectives guides. Some of them are unrelated papers but still featured because they met some of the search terms. So, the sample was critically appraised and evaluated by the authors to filter the irrelevant papers. These criteria were adopted to

improve reliability of the synthesised findings by limiting the review to empirically supported evidences. The next step involved the snowballing sampling technique.

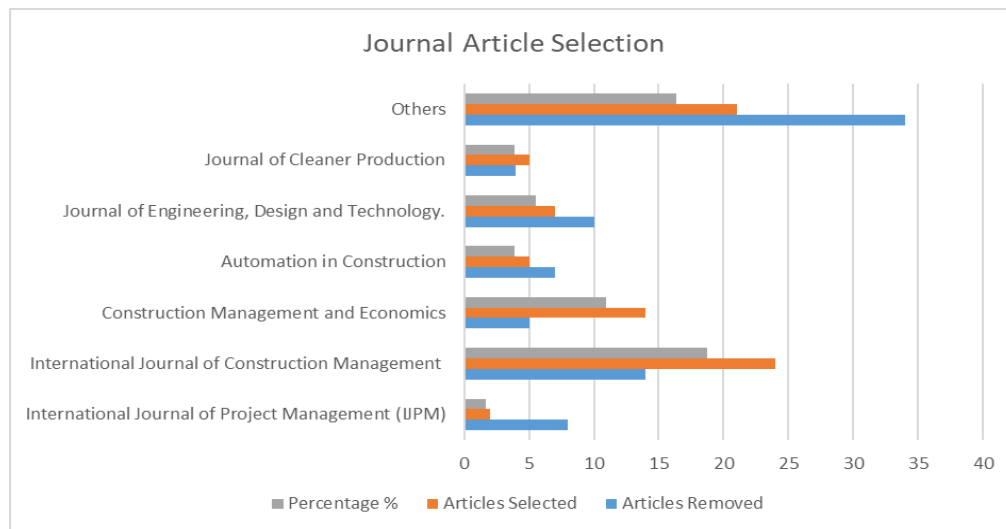


Figure 1: Journal articles retrieval and selection

4 Results and Discussion

In terms of managing constructions sustainably, results from analysis of previous reports suggest the existence of an imbalanced focus on economic and environmental factors over the years. Aareth et al (2016) how conducted a similar review on sustainability strategies revealed a strong relationship between sustainability and stakeholder integration. Construction management processes as described by Yu et al (2005) prioritise performance on critical factors like time, cost and quality. Tchumtcha (2021) believes that the use of partial stakeholder integration for propagation only is unsustainable. On the contrary, holistically integrating all stakeholders through the processes like planning, designing, construction, maintenance and demolition is a more sustainable strategy. Unfortunately, Zulu et al (2022) confirmed that sustainability is not important to African infrastructure developers because their focus is on cost effectiveness. Evidently, a sustainable management strategy (SMS) is the best approach to sustainable construction. It provides a complete stakeholder integration, which is a clear switch from Hancock and Tyler's (2009) scientific management systems. This is fascinating, as Maiti and Choi (2021) identified lack of stakeholder integration as the greatest cause of conflict in construction industry. Which collaborates Hamza et al. (2019) conclusions that 'peoples factors' show the highest inconsistency of all project resources as well as the major source of risk. Hence, the Chinese project management strategy, which Tchumtcha (2021) reported as unfriendly, lacks community-based engagement and delivers unsatisfactory construction projects is conflict and risk prone. Ingle and Mahesh (2020) rank customer relations and safety in the top two construction stakeholders' satisfaction indices in India. El-Sawalhi and Hammad (2015) reported manager's competencies, transparent evaluation of the alternative solution, effective communication, setting common project goals and objectives, and exploring the

stakeholders' needs and expectations are the main factors affecting the stakeholder's management in Gaza.

Consequently, managers' emotionally intelligence in SI is critical to deliver sustainable construction. However, Lawani and Moore (2021) warned that this must take into consideration both cultural orientation and nature of the activities. In a simple term, Liu et al. (2020) indicated that culture directly drives the project management principles toward sustainable construction. They revealed that by influencing mediator factors of strategy, implementation, and reflection, culture is found to present an indirect influence on sustainable construction. And, while influencing mediator factors of implementation and reflection, strategy is also found to indirectly influence SC. 'It should be noted that construction management studies conducted between 2001 to 2015 and 2015 to 2021 focused on 'SI', 'LCA', 'performance measurement', 'value management' 'automation in construction', 'BIM' 'teamwork', 'emotional intelligence' 'AI' 'quality management system', 'lean construction' for sustainable construction. However, there still exist a gap in sustainability performance (Zulu et al. 2022; Tchumtcha 2021; Hassan et al 2022). Outstanding evidence of this study is emphasis of existing research on complete SI in these strategies and across processes is yet to be achieved and it requires attention.

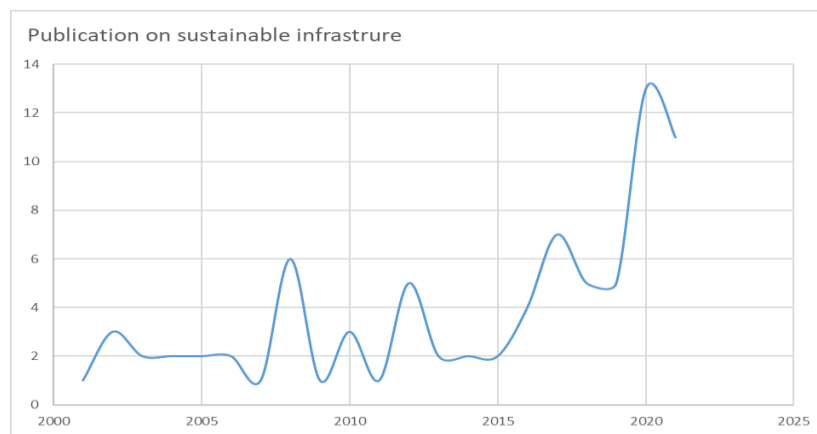


Figure 2: Publication on sustainable infrastructure 2002-2022

These imply that the globally accepted key performance indicators of cost, quality and time may have been overtaken by SI, satisfaction and safety, at least in Africa (Zulu et al. 2022; Tchumtcha 2021), India (Ingle and Mahesh 2020) and Middle East El-Sawalhi and Hammad 2015) regions. Zainon et al (2020) observed in Malaysian construction industry, hybrid (digital) skill and willingness to change (culture) are two top skills for SI. This structural change will reduce waste and corruption in delivery of sustainable construction (Monteiro et al 2020). Nonetheless, it is remarkable that publications on sustainable construction and SI have fluctuated over the last two decades with significant rise in 2008, 2010, 2017 and a massive spike in 2020-2021 as demonstrated on figure 2. Typically, the figure 2 makes its usual and downward curve in 2021, this current and enormous focus on SC may be linked to the impact of the Covid-19. Indicating that the fluctuations are linked to global economic and environmental challenges. Remarkably, observation from figure 2 suggest increased publications during and after every major global economic and environment disruptions in the last decades. Thus, research focus on SI in SC is directly proportional to economic and

environmental challenges. The focus has always been on the two of the three cardinals of sustainability. Even though Larsson et al (2022) warn that sustainable solutions must have long term reliable benefits to all stakeholders and its procurement strategy should influence both the process and outcome. This must strengthen interrelated roles and responsibilities of stakeholders, taking into account the principles of safety, stability resilience and harmony of construction and environment (Willar et al 2020).

5 Conclusion and Further Research

Through this study, we have examined other existing studies on SI for sustainable construction. Evidences from the 81 analysed papers across 6 major construction management journals and 20 others, suggest an imbalanced focus on economic and environmental factors of sustainability in the last 20 years. Notably, a fluctuation in publication output exists between 2001-2017 and a massive spike in publication in 2020 with a decline curve in 2021. Clearly, SI discussions for sustainable construction are directly proportional to economic and environmental challenges. Processes like planning, design, manufacturing, construction maintenance and demolition require complete SI for sustainability. Hence, SMS is the complete integration of all stakeholders across the project management processes of planning, design, construction, maintenance and demolition. Modern project management processes should therefore amongst the integration of skills, digital and technological competencies, lean philosophy, focus on the expectations and wellbeing of all stakeholders. Since researchers are by nature pragmatic and not reactionary, sustaining the current and enormous focus on SI for sustainability is very important.

This study did not only identify pattern of publication in SI for sustainable construction in the last 20 years, it provokes more attention and study in SI. It further highlights and calls for sustained focus of policy makers and researchers on SI for SC. Clearly, it is time to reintroduce ‘the people factor’, to attain the social construes of sustainability. Further studies should amongst other topics, explore and develop a model for complete SI across construction management processes. The studies should further review journals and search engines omitted by this study.

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