

ENHANCING ON-SITE STAKEHOLDER- INTEGRATION AND STANDARDS' COMPLIANCES THROUGH OF AN EVOLVED ISTRUCTE PLAN-OF- WORK FRAMEWORK

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Despite the importance of stakeholder integration on standards' compliances and on-site timelines and capex, limited work has been done that aligns, on the one-hand site-success measurables, with on the other-hand structured practical mechanisms across diverse cultural and regulatory contexts. The work discussed here, addresses this gap using a mixed-methods research approach that includes qualitative semi-structured interviews with industry experts to build necessarily upon relevant secondary research, then clarify key stakeholders, determine the root causes of inadequate integration, assess the impact on on-site compliance, and ultimately present a newly developed framework for effective stakeholder integration through evolving the available IStructE plan-of-work guidance tool. The findings show significant regional differences in stakeholder identification, compliance strategies, and communication tools. The study also identifies common challenges in stakeholder integration, such as communication breakdowns and competing interests. Based on these findings, a stakeholder integration framework is presented that's able to be tailored to different regional contexts. This study adds to an understanding of stakeholder integration in various construction environments and lays the groundwork for developing more effective, context-aware strategies for improving on-site compliance in building and structural projects.

Keywords: Construction, Productivity, Flowchart, Qualitative method.

1 BACKGROUND

The construction industry faces challenges in project delivery, with stakeholder integration being a prominent issue (He *et al.* 2019, Whyte 2014). Whilst engaging all relevant parties throughout the project lifecycle can lead to enhanced project outcomes, industry currently struggles with this. A study by Lees *et al.* (2022) highlights how insufficient stakeholder engagement in Western Australian public-sector construction projects, leads to cost and time overruns stemming from inadequate procurement planning and precontract (stakeholder) decisions - resulting in potentially avoidable instances of non-compliance with standards, design defects, construction errors, delays, budget overruns, and safety risks. There is therefore a need to identify key factors influencing stakeholder integration, evaluate their impact on compliance, and develop a comprehensive framework for enhancing collaboration.

By examining stakeholder integration mechanisms, the work presented here (i) identifies key stakeholders and their roles; (ii) investigates causes of poor stakeholder integration; (iii) assesses impact on on-site compliance through case-studies; (iv) develops a structured stakeholder integration framework; and (v) proposes practical recommendations for improvement.

2 LITERATURE: STAKEHOLDER INTEGRATION AND ON-SITE COMPLIANCE

Ensuring design and installation compliances in building and engineering projects requires effective stakeholder integration. Current available frameworks towards interdisciplinary interaction include the Institute of Structural Engineers *IStructE's Plan of Work*, which itself references the Royal Institute of British Architects *RIBA Plan of Work* (The Institution of Structural Engineers (IStructE) 2020, RIBA Plan of Work 2020). Respective *Plan of Work* approaches are increasingly subject too, to Building Information Modelling *BIM* initiatives to integrate disparate specialist contribution (NATSPEC 2011, ISO 19650-1:2018 2018); albeit BIM adoption in many locations is subject to a further need for some form of government support to tailor implementation of respective integrative strategies (Amin and Abanda 2019).

The importance of stakeholder integration across various sectors to mitigate risks and ensure project success are recognized (Van Broekhoven and Goswami 2021); as is, the need for disparate specialists' solutions to be structured within building information models. Such digital-model data-distributions bring together building-energy modelling and life-cycle assessments, and enhance technological collaboration and communication and, by extension, address coordination and clash-detection by, for example, an ability to identify early, errors such as structural members being spliced by mechanical and electrical services. (Stendahl *et al.* 2022, Whyte and Donaldson 2015)

Multi-criteria decision-making (MCDM) approaches that consider diverse stakeholder perspectives alongside, organizational solutions that facilitate employee empowerment through involvement in installation, are also important (Alazzaz and Whyte 2015). These approaches collectively aim to improve stakeholder engagement, enhance decision-making, and ensure better compliance throughout the project lifecycle. In summary, current approaches to ensuring specialist input do exist but, it's argued, uptake via a comprehensive collaborative framework is lacking.

2.1 Challenges to Integration

Despite the solutions discussed above, challenges in implementing stakeholder integration remain. Additional management obligations can burden contractors' tendering processes, potentially preventing successful collaboration (Urquhart and Whyte 2020). Project complexity and strict regulations can impede efficient communication and coordination; a gap exists between theoretical frameworks and practical implementation, necessitating context-specific solutions (He *et al.* 2019). There is a lack of consensus on critical success factors (CSFs) for project success, that highlight the need for investigations into elements contributing to successful stakeholder collaboration and on-site compliance. Generally, consequences of poor integration stem from: divergent expectations; communication breakdowns; conflicts of interest; design defects; expensive rework and delays; construction inaccuracies; and relatedly, increase the risk of accidents and unsafe behaviors on construction sites. Stakeholder integration can be acknowledged as an essential component of project success and on-site compliance (Lees *et al.* 2022, Amin and Abanda 2019, Whyte 2014).

Effective stakeholder management is critical since client-caused delays have been demonstrated to have a significant impact on project durations and costs (Alenazi *et al.* 2022). According to Alhajri and Alshibani (2018), research conducted in Saudi Arabia has revealed that financial and contractual challenges (and by extension, challenges in integrating the obligations and responsibilities of the parties to the contract) are a primary reason behind industrial project delay. This highlights the intricate nature of delay and stakeholder alignment, not least in newly developing regions such as Saudi Arabia which faces regional challenges due to the changing regulatory frameworks that are being applied to ongoing and future large development projects.

The literature review above emphasizes the need for context-specific approaches to stakeholder

integration, considering factors like project complexity, cultural variations, legal frameworks, and human motivations. This study addresses stakeholder integration issues of non-compliance, poor design, delays, overspending, and safety hazards, not by reinventing the wheel, but rather by building upon the existing IStructE Plans of Work to enhance project progression.

3 METHODOLOGY

This study uses a mixed-methods approach to examine the impact of stakeholder integration on on-site compliance in building projects. It focuses on Australia and Saudi Arabia, offering a comparative examination of practices in respective regulatory and cultural situations. The theoretical framework is based on Creswell and Creswell's (2018) Mixed Methods Approach and Yin's (2017) Case Study methodology. The study recognizes McGowan *et al.* (2015)'s adaptive management with numerous stakeholders and McDermott (1999)'s strategic concerns in building procurement, to develop a more nuanced understanding of stakeholder integration techniques and their on-site compliance impact, examining both general patterns and situation-specific elements.

3.1 Case Studies' Sample Selection: Australia and Saudi Arabia

Australia's robust and well-established building regulatory structure provides insights into best practices in developed economies (Governance Institute of Australia, 2022), whilst Saudi Arabia's changing regulatory landscape within an expanding construction industry brings unforeseen stakeholder integration challenges; the use of FIDIC contracts set within overarching cultural directives in Saudi Arabia, highlight distinctive construction progressions (Fageha and Aibinu 2016). This study then, analyses stakeholder integration approaches across differing legislative frameworks, thus informing enhanced strategies for future projects in diverse global settings.

Qualitative data collection via semi-structured interviews with four prestigious industry experts sought thematic analyses to identify patterns and themes. The study employed targeted sampling to select participants based on their expertise, experience, role diversity, and qualification. Participants were chosen from both Australia and Saudi Arabia to facilitate comparison and provide diverse perspectives on stakeholder integration and on-site compliance in construction projects. The interview structure included sections on background information, definitions, and project management and stakeholder engagement, crafted to elicit detailed responses on topics such as stakeholder integration, compliance impact, procurement processes, technological solutions, and quality management, and recommendations for developing effective frameworks. The limitations of this study are recognized. Four participants' responses (albeit from experienced personnel with upwards of 80 years between them, and thus compliant with Creswell and Creswell (2018)'s 2018 phenomenological quorum) may be less broad. Depth, however, does allow a divergent regional focus of insightful information about on-site building compliance and lived-experience integration.

4 RESULTS AND CONCLUSIONS

The data garnered is noted across themes, namely: roles; engagement; compliance; collaboration; technology; structures; stakeholders' operations; feedback and regional issues; as below:

Qualifications and Roles: The study's participants necessarily noted a diverse range of credentials, including safety certifications and technical degrees. This diversity highlights the value of a range of expertise in tackling the intricate problems of contemporary building and reflects the (increasingly) multidisciplinary nature of construction projects.

Stakeholder Identification and Engagement: There was a clear distinction between the methods used by participants from Saudi Arabia and Australia to identify stakeholders. Saudi participants

concentrated more on government institutions' given tender-lists, whereas Australian participants highlighted competitive/negotiated stakeholder selection. This variance emphasizes customized interaction to take-into-account local cultural norms and legal frameworks.

Methods of Compliance: The two regions' methods to compliance were very different. Saudi participants concentrated on overarching regional labor laws and local safety regulations that sit adjacent to general conditions of contract (GCCs), while Australian participants sought party responsibility and obligation explicit within GCC standards such as AS2124 and AS4000. Flexible compliance tactics require then, to consider disparate regulatory contexts.

- *Tools for Collaboration and Communication:* There were regional differences in the utilization of collaboration and communication tools. Saudi participants used safety management performance specification systems for real-time reporting of tasks' progressions, whilst Australian participants mostly used shared project management software. Thus, customized communication is required to adapt to local needs and preferences.
- *Integration of Technology.* Regional differences were also evident in technological integration. In Saudi Arabia, smartphone apps (WhatsApp-&etc. synchronous electronic communication devices) were common for tasks' progressions' updates and safety reporting, in lieu of, the often available, BIM systems, that are widely utilized in Australia for building integration review; Tech. uptake in diverse regional contexts, requires stakeholders' flexibility.
- *Framework Development:* Both areas' participants stressed the importance of well-defined responsibilities, open lines of communication, and frequent framework development progress reports. A construction-culture that values stakeholder integration is common, and to be fostered in organizational buy-in at all levels (via structures such as the IStructE Plan of Work, notwithstanding the variables above) for the successful implementation of (enhanced) frameworks.
- *Challenges in Stakeholder Integration:* Participants frequently mentioned communication breakdowns and competing interests as difficulty, if a Plan of Work was under-emphasized. These difficulties emphasized the need for user-friendly clear guidelines and flow-charts, to ensure context-sensitive applications across all regulatory contexts and cultural contexts.
- *Quality Management and Operational Excellence:* The participants gave a variety of examples of operational excellence and quality management techniques. The significance of incorporating quality management concepts into stakeholder integration procedures is highlighted.
- *Feedback and Continuous Improvement:* Participants discussed a range of improvement projects and feedback systems. This emphasizes how important it is for stakeholder integration methods to have strong feedback loops and ongoing improvement procedures.
- *Regional Differences.* Australia and Saudi Arabia were found to have somewhat different approaches to stakeholder integration. These variations underline the necessity of region-specific adaptive strategies, for managing compliance and integrating stakeholders, taking into consideration regional regulatory frameworks, cultural norms, and local business practices.

5 CONCLUSIONS AND KEY OBSERVATIONS

The key observations of this work are argued to center upon the need to recognize that different environments have different regulatory frameworks and that cultural norms have a major impact on the regional variations in stakeholder integration strategies within Saudi Arabia and Australia. Saudis focused on government institutional directives, whereas Australians gave priority to a broader spectrum of stakeholders' identifications and selection mechanisms. Saudis relied on overarching performance-specifications related to country-wide labor laws and safety regulations,

while Australians followed standards made explicit within the project-specific GCCs and related singular-project contractual documentation. The tools used for cooperation and communication also differed: Saudis used less formalized mobile apps, while Australians emphasized BIM updates.

It can be concluded that the requirement for relevant strategies for stakeholder integration and compliance management, based on local regulatory environments, cultural norms, and industry practices are key. Successful integration depends on effective communication, notwithstanding the range of preferred approaches. Stakeholder integration can be enhanced by technological solutions, although regional adoption-use differs. Strategies for compliance must be adaptable to diverse project regulatory settings. Feedback loops and continuous improvement are crucial for enhancing stakeholder integration and project results.

The flowchart below (Figure 1) is populated from the results and conclusions above, and presents a road map for stakeholder integration, building upon the IStructE/RIBA Plan-of-Work, to necessarily guide parties through the (red-box) project steps of: definition; concept-design; production-information; construction; and asset utilization; towards feedback for a next project - building on the (yellow/white-boxes) of Plan-of-Work stages – incorporating the unboxed enhancement recommendations stemming from the work summarized above, and presented here. The flowchart steps through: (1) Strategic Definition & Preparation; (2) Conceptual Design & Spatial Coordination; (3) Technical Design & Product Information; (4) Manufacturing Construction & Handover; and, (5) Use, Evaluation & Continuous Improvement.

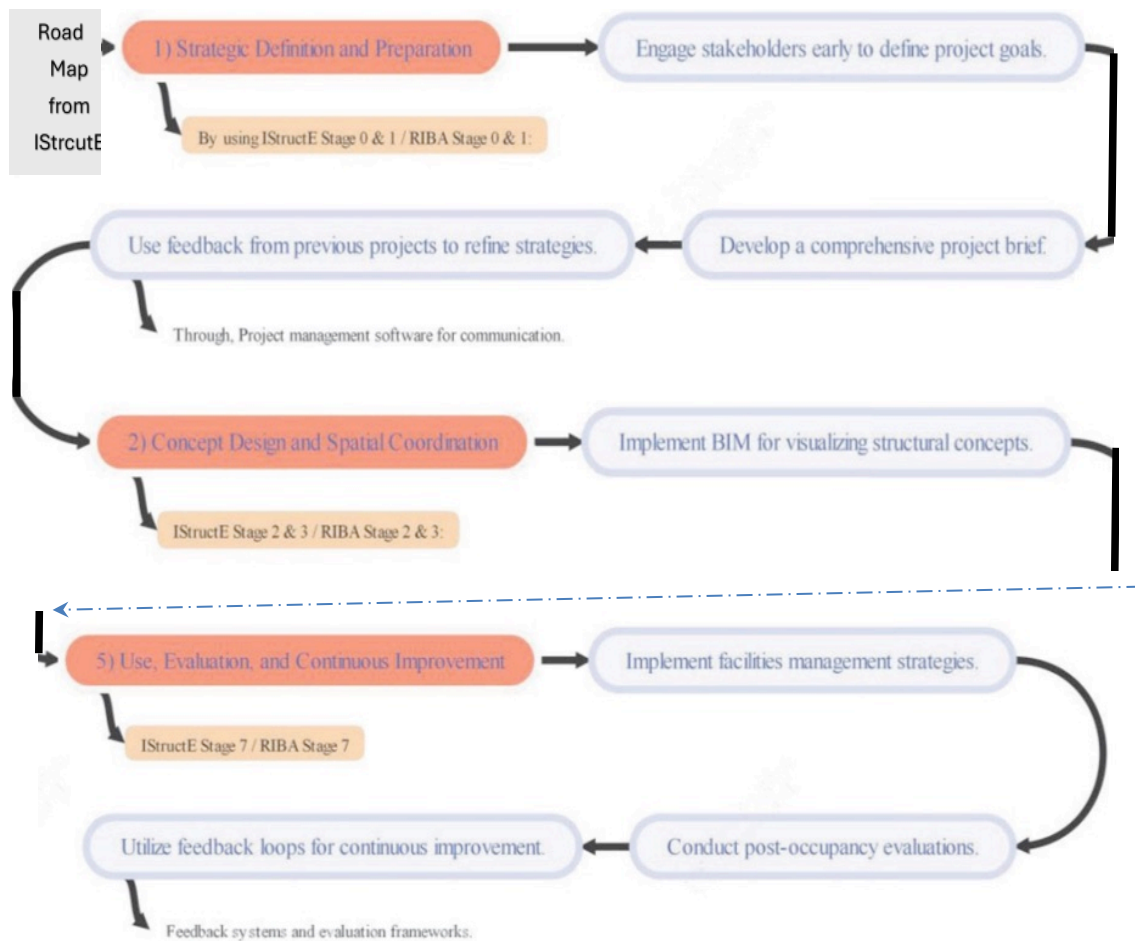


Figure 1. Engineers' road map for stakeholder integration building upon the IStructE plan of work.

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