Transforming Decision-Making: A sociotechnical inquiry into Digitalisation and Social Sustainability in Infrastructure Project Organisation

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Research Problem Statement or Purpose

Digitalisation is increasingly shaping infrastructure project organisation (Adebayo et al., 2025; Olanipekun & Sutrisna, 2021). Among the technologies driving digitalisation within these projects, building information modelling (BIM) and artificial intelligence (AI) are increasingly recognised for their ability to support coordination, collaboration, scenario modelling and simulation, enabling project managers to compare alternative resource allocation strategies and identify optimal options based on data-informed assessments of performance and risk (Nabeel, 2024; Wijayasekera et al., 2022). Despite reported performance benefits of digitalisation in project management, little is known about how it reshapes interactions, perceptions, and behavioural responses among project managers, teams, and stakeholders (Almeida et al., 2025; Papadonikolaki et al., 2025). As project work is fundamentally human-centred and stakeholder-laden, this technological change cannot be considered independently of its social implications. Digitalisation cannot be treated as a purely technical upgrade; it intervenes in socio-organisational processes and everyday project practices. Additionally, while innovative digital technologies have the potential to support the social sustainability of infrastructure projects, existing research highlights a lack of evidence on how these technological advancements within projects intersect with broader social dimensions, particularly diversity, equity, and inclusion (DEI) (Heydari et al., 2024; Rostamnezhad & Thaheem, 2022).

Furthermore, project organisation must evolve to effectively address emerging real-world challenges, including sustainability, climate change and shifts in the global order, at a time when the next 25 years will require an unprecedented global investment in physical infrastructure, estimated at approximately $64 trillion (Eriksson et al., 2023; Gilhooly et al., 2025). This presents a pressing challenge for engineering project organisation as the volume and complexity of project work is only set to increase. Capturing the organisational and social dynamics introduced by digitalisation is challenging using traditional project management frameworks (Marnewick & Marnewick, 2022), which often assume stable organisational

boundaries, linear decision-making processes, and delineated roles. This limitation becomes more pronounced as digitalisation in these projects accelerates and diversifies, with the increased use of AI, BIM, digital twin technology, and data-driven analytics that interact across project stages and within organisations. This acceleration heightens the need for analytical approaches capable of tracing how these technologies collectively reconfigure decision-making networks.

Previous studies have demonstrated the value of Actor–Network Theory (ANT) for examining digital technologies in project-based contexts, as it conceptualises technological change as an ongoing, relational process shaped through interactions between human and non-human actors. Harty (2008) demonstrates that ANT enables researchers to follow how technologies, practices, and actors are continually translated, negotiated, and reassembled during implementation, without assuming fixed boundaries around projects, organisations, or technological systems. Additionally, Linderoth (2010) applies ANT to the study of BIM implementation, showing how each new project assembles a different coalition of actors whose prior experiences influence how roles and relationships are negotiated within project networks. By tracing interactions between human and non-human actors, this study explores how digitalisation redistributes knowledge, authority, and responsibility, and what implications this has for social sustainability, particularly stakeholder participation and inclusion. Accordingly, this study addresses the following research question:

How does digitalisation reconfigure decision-making networks and shape project managers' engagement with social sustainability in infrastructure projects?

Brief Research Methodology and Approach,

This research adopts a qualitative case study approach as its primary methodology. The study presents an examination of an energy transition infrastructure project in the Netherlands and Germany. Case study research is particularly well-suited to project management studies, as project work is strongly shaped by social and behavioural dynamics as well as project-specific contextual factors (Martinsuo & Huemann, 2021). The case was selected due to its high level of digital maturity and is treated as a single, exploratory case study (Yin, 2002). Data is being collected through fifteen semi-structured interviews with project participants, complemented by analysis of project documentation. Secondary data sources, including online information and newspaper articles, are also used to provide additional contextual insight into the project environment. The qualitative dataset generated through these methods will be analysed using a thematic analysis approach to identify patterns, relationships, and emergent insights in relation to the study's research question.

Drawing on a socio-technical systems perspective, the research adopts Actor–Network Theory (ANT) (Latour, 2005), as an analytical lens to examine how decision-making emerges from the interactions, negotiations, and alignments within these actor-networks. ANT enables an exploration of how digital technologies redistribute agency, knowledge, and stabilise or contest decision-making practices, with consequences for participation, inclusion, and social sustainability. Importantly, this approach helps identify different ways in which human actors (project managers, engineers, and other stakeholders), non-human actors (digital tools and

data standards), and organisational processes can be configured to support better communication, reflection, and stakeholder involvement.

Key Findings

This exploratory research draws on data from approximately fifteen semi-structured interviews with project participants. The preliminary findings indicate that digitalisation is reshaping decision-making through the reconfiguration of actor-networks, in which human actors (such as project managers and stakeholders) and non-human actors (including digital tools, data, and standards) are becoming newly aligned or contested. These reconfigurations appear to influence the uptake of digital data within decision-making practices, sometimes unevenly, and can introduce tensions between digitally generated insights and human judgment.

Additionally, the preliminary findings suggest how digital technologies exercise agency within project networks, influencing how decisions are stabilised, negotiated, and enacted across organisational contexts. This provides insight into how digitalisation is shaping the distribution of knowledge, authority, and responsibility among project actors, with implications for project organisation and coordination. Importantly, the findings underscore consequences for social sustainability, particularly in relation to stakeholder diversity, inclusion, and participation, as well as the patterns of connectivity and communication through which project decisions are produced.

Implications

This research will contribute to the growing body of knowledge on digitalisation and decision-making in infrastructure project management by advancing understanding of how digital technologies are interpreted, enrolled, and enacted within complex project networks. Through an exploratory case study, the research will generate rich empirical insights into how digitalisation is embedded in everyday project practices, and how digital artefacts, data, and standards shape, enable, or constrain decision-making through their interactions with project stakeholders. From a theoretical perspective, the findings are anticipated to extend socio-technical systems thinking through an ANT lens, illustrating how decision-making emerges from dynamic relations between human and non-human actors within project settings.

ANT contributes to a practice-based perspective by viewing projects as fragile organisational arrangements that depend on ongoing, collective processes to align the interests of diverse actors within the project (Floricel et al., 2014). Building on this perspective, this research will develop a qualitative decision-making framework that captures how decision-making emerges through interactions between human and non-human actors in digitally mediated project environments. In doing so, the study aims to offer insights for project managers and organisations into how digitalisation may be configured to support more inclusive, connected, and socially sustainable project environments. The findings will inform the articulation of governance arrangements, decision-making processes, and stakeholder engagement practices that recognise the active role of digital technologies while maintaining meaningful stakeholder participation. Collectively, these implications are intended to support

more reflective and responsible approaches to the integration of digitalisation in infrastructure project management and engineering project organisation.

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