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Developing Green Citizenship Behaviours in Mega-Projects Using Cross-Case Studies Based on Social Network Analysis

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1. Introduction

Megaprojects are defined as large-scale and complex ventures that typically cost \$1 billion or more and take many years to develop and build; these projects generally involve multiple public (national interested) and private stakeholders with transformational impacts on millions of people (Flyvbjerg, 2014 [CrossRef]). Since the early 2000s, megaprojects have become an emerging area in the field of construction project management due to global urbanization, urban revitalization, and redevelopment (Flyvbjerg, 2014). Given such objective-oriented for public goods of megaprojects, endeavour of managing mega investment, vast complexity and far-reaching influence on the economy, environment, and society (Brookes and Locatelli, 2015). For example, Three Georges Dam, is a major concern for megaproject management. The dam is projected to incur additional costs of \$26.45 billion over the next decade to address its environmental issues. This is particularly significant given the global push towards achieving the sustainable development goals (G. Wang *et al.*, 2017). Sustainable development refers to development that meets current needs without limiting the possibility of meeting future needs (Wu *et al.*, 2018). The current unpromising situation has triggered stringent need to improve the environmental performance of megaprojects (Xie *et al.*, 2022).

Increasing concerns for sustainability, led to research in sustainable project management, including environmental, economic, social, and technical sustainability (Shi, Zuo, and Zillante, 2012; Brooks and Rich, 2016, Kiani Mavi *et al.*, 2021). Incorporating sustainable principles in large-scale construction projects is challenging due to various reasons, such as material waste, stakeholder conflicts, inadequate use of project management tools, and legal and social limitations, resulting in cost and time overruns (Brooks and Rich, 2016; Demirdöğen *et al.*,

2021). Current research highlights the complexity and implications of megaprojects (Brooks and Rich, 2016; Koseoglu *et al.*, 2019; Sepasgozar *et al.*, 2021; Wu *et al.*, 2018; Larsson and Larsson, 2020; Ma *et al.*, 2021; Erickson, 2015). Although green tools are introduced in megaprojects, such as ISO 14000 and environmental impact assessments, their effectiveness is limited (G. Wang *et al.*, 2018). For example, Brooks and Rich (2016) examine sustainable procurement through interviews and questionnaires with six key contractors and nine key stakeholders involved in some of London's largest real estate and transport infrastructure projects. Koseoglu, Keskin, and Ozorhon (2019) conduct a two-phase semi-structured interview after analysing the Istanbul new airport project case, in order to summarize the challenges and drivers of digital transformation through Building Information Modelling (BIM). Hooft *et al.* (2021) study how construction automation and robotics (CAR) can facilitate the sustainable transformation of mega construction projects, which are Public-Private Partnership (PPP) projects. Wu *et al.* (2018) and Larsson and Larsson (2020) show that compared to traditional construction projects, large-scale green construction projects place more emphasis on kinds of stakeholders such as the public, suppliers, financial institutions, governments, and contractors. Due to megaprojects are public-facing, intense-technical orientated, facing the need of managing complex requirements from diverse stakeholders, these not only require formal, explicit, and managerial aspects such as the implementation of management systems, programs, or technologies, but also informal and proactive behaviours undertaken by actors in the project network (Boiral, 2009; He *et al.*, 2015; G.Wang *et al.*, 2017, 2018; Yang *et al.*, 2018).

This behavioural aspect of project participates is attached with great significance in

contributing to megaproject sustainability (Xie *et al.*, 2022), because their spontaneous and voluntary initiatives have presented large potential in furthering environmental performance (Boiral *et al.*, 2016; He *et al.*, 2015; G. Wang *et al.*, 2017). These individual behaviours are in pursuit of altruistic principles instead of maximising their own benefits (Yang *et al.*, 2018), where they prioritise outcomes for others (e.g. project benefits) over those for themselves (e.g. organisational benefits). Given such significance of understanding sustainability of and behaviour within megaprojects that have been confirmed by researchers, how can megaprojects promoting green behaviour facing complex stakeholder needs and interest which are still under researched.

Green citizenship behavior is voluntary, but collaboration between individuals is crucial for environmental management in megaprojects due to their complex nature and the involvement of diverse participants throughout the project life-cycle(Xie *et al.*, 2022). Existing research on Green citizenship behavior may no longer meet the current status of engineering development with the expanding range of stakeholders and evolving citizen concerns(G. Wang *et al.*, 2017).

Lists of Research Objectives(future)

This research hence aims to develop a communication framework for companies and project managers to promote green citizenship behavior in megaprojects' complex and long-life cycle context. The objectives are:

- 1.To review industrial characteristics of megaprojects;
- 2.To review the literature of sustainable behavior in order to identify the green citizenship in megaconstruction projects;
- 3.To review the literature of sustainable behavior in order to identify the green citizenship in megaconstruction projects;

4. To research theoretical frameworks that suit for studying citizenship behaviours in megaprojects;
5. To establish a development framework for green citizenship in megaprojects .

2. Literature review

2.1 Green Citizenship Behaviour in megaprojects

Promoting green behaviors in large-scale construction projects is important, but translating formal management strategies into practical initiatives is a challenge. Shi, Zuo, and Zillante (2012) analyzed the planning and implementation of sustainable buildings for the 2010 Shanghai World Expo using a case study approach, but more research is needed, particularly cross-case studies of green citizenship in large-scale projects. This paragraph can be shortened as follows: "Organisational citizenship behaviour (OCB) is a concept coined by Organ (1988) that refers to discretionary behaviour that promotes efficient and effective functioning of an organisation. Boiral and Paillé (2012) expanded on this to propose the concept of environmental OCB, which includes individual and discretionary behaviours that contribute to effective environmental management. This is sometimes referred to as green citizenship (D'Arco and Marino, 2022). Green citizenship behavior (GCB) in megaprojects are positive, discretionary social behaviors that are not included in contracts but contribute to effective environmental management (Organ *et al.*, 2005; Yang *et al.*, 2018).

Braun *et al.* (2013) specifically investigated OCB in temporary organisations and revealed its contribution to meeting the 'iron triangle' of project management. Khodeir and Nabawy (2021) pointed out the key challenge in megaproject is the

scarcity of well-qualified and trained workers, especially in developing countries. This fact indirectly reflects a lack of citizenship in megaproject human resource.

In construction, GCB includes sharing opinions on onsite pollution, questioning eco-unfriendly activities, and collaborating with environmental departments (G. Wang *et al.*, 2018), reflecting a willingness to engage in environmentally responsible practices (Boiral, 2009) that help alleviate human resource issues and develop knowledge and skills (Boiral *et al.*, 2016).

3. Developing Green Citizenship in megaproject Organisations

Scholars have investigated citizenship behaviours for the environment in terms of, for example, the pertinence of citizenship to the improvement of corporate greening (Boiral, 2009), instrument for measuring GC (Boiral and Paillé, 2012), and intrinsic drivers and values underlying GBC (Boiral *et al.*, 2016). To date, research on developing and maintaining the individual, informal, and voluntary initiatives has received less attention in academia, compared with that on formal interventions which are considered more effective in coping with environmental issues (Boiral, 2009).

Main scholarly contributions to GCB development in megaprojects were attributed to G. Wang *et al.* (2017) who studied the influence of project organisations' environmental responsibility on organisational GCB by practitioners, with a later emphasis on the impact of institutional pressure on project practitioners' GCB, project culture, potential promotion, corporate reputation, and public satisfaction. (G. Wang *et al.*, 2018, T. Wang, 2017).

Green citizenship behaviors are voluntary actions taken by employees outside of

their job roles, promoting sustainable development and reducing resource consumption. They complement corporate green strategies and human resource management, improving environmental and corporate performance. Implementing green management practices increases employee support and commitment. Social exchange relationships promote sustainable operations, but megaprojects involve numerous participants and non-one-to-one relationships. Various behaviour theories were applied by researchers to investigate the development of citizenship behaviour. Social Exchange Theory (SET) emphasizes that actors initiate and maintain exchange relationships with target individuals under the expectation of obtaining rewards, which in turn encourages target individuals to respond to actors (Blau,1968; Homa,1958). Repeated exchange of equivalent resources and social exchanges can serve the interests of both parties, develop positive reciprocity, and develop high-quality relationships.

The theory of planned behavior is more conducive to understanding green citizenship behavior in megaprojects involving multiple stakeholders(Boiral, and Pascal, 2012; Paille, Chen, Boiral, and Jin, 2014). The Theory of Planned Behavior (TPB) explains that behavioral intention is the primary determinant of behavior, influenced by attitude, subjective norm, and perceived behavioral control. Attitude reflects an individual's assessment of the likelihood and outcome of a particular behavior. Subjective norm refers to the social pressure perceived by an individual when deciding on a behavior, influenced by expectations and motivation to comply. Perceived behavioral control reflects an individual's perception of the ease or difficulty of performing a behavior, reflecting promoting and hindering factors. (Ajzen, 1991). Encouraging green citizenship behavior can benefit large projects economically and socially.

4. Proposed Research Methods

Eisenhardt(1989) defined a case study is as a research strategy involving an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence. Multi-case study research is an appropriate methodological approach for this study , because in multi-case study designs, different cases are studied in order to understand the similarities and differences across cases. This approach enables the investigation of the phenomenon in various settings and allows for a robust comparison, thereby increasing the external validity of the findings (Eisenhardt, 1989; Yin, 2018).

For this study, we will select a large municipal engineering company A based in northern China, possessing multiple qualifications in design, construction, and engineering research. The selection of company A is predicated on its track record in managing megaprojects, a critical criterion for understanding the development of green citizenship behaviour. The unit of analysis in a case study refers to the primary entity that is being analyzed in a particular study. The unit of analysis can be, for example, individuals, groups, artifacts, geographical locations, social interactions, or events. In other words, it is the case or unit being studied within a single study or investigation (Eisenhardt.1989). In this study, the unit of analysis would be the employees of this company who are responsible for participating in such project management practices.

Based on Flyvbjerg's (2014) definition, we will select eligible projects within company A as our cases for the multi-case study. The selection criteria for the projects include:

1, The projects should be considered as megaprojects, i.e., they should have costs exceeding \$1 billion, involving multiple stakeholders and having transformational impacts.

2, The projects should involve sustainability issues, i.e., they should have a substantial environmental, economic, or societal impact.

The data for the case studies will be collected through semi-structured interviews with project managers and stakeholders, document analysis, and direct observations. We aim to understand the different perspectives of various stakeholders regarding green citizenship behavior and the factors influencing this behavior. The multi-case study approach will allow us to understand the nuances of promoting green citizenship behavior in megaprojects across different settings and under different circumstances. The findings will also help in the development of strategies for enhancing green citizenship behavior in megaprojects.

Secondary data will be collected from the corporate public social media account content and corporate publicly published meeting minutes to identify exchange relationships and information or value that are being exchanged. Interviews will be conducted to identify networks in GCB development and enable Social Network Analysis (SNA). SNA can identify stakeholders and factors that influencing behavior, which is affected by various factors such as laws, regulations, green guidelines, and competitors' actions. Different project participants perceive different factors promoting or hindering behavior, and contractors must consider both economic interests and social responsibility. Using the theory of planned behavior, this study explores factors influencing stakeholders' engagement in green citizenship behavior.

The rationale for undertaking SNA is twofold: organisations in megaprojects are suspended in multiple, complex, and overlapping webs of relationships and actions of actors in organisations can best be explained with reference to their position within a network of relationships. (Pryke, 2012).

5. Contribution

Studying GCB is important both theoretically and practically, but its relevance to megaprojects and the role of digital tools in promoting it is underdeveloped. Understanding GCB development can promote green strategies, improve conflict management, enhance project performance, and benefit society. It can also test organisational behavior theories in contemporary megaprojects. This study has conducted a narrative literature review of green citizenship and megaproject context. In future, a more comprehensive literature will be conducted to These will help promote green behaviors, resolve conflicts effectively, and ultimately, improve overall project performance. Furthermore, this research could help test and refine existing organisational behavior theories within the context of contemporary megaprojects. By identifying the communication mechanisms, the corporate management group can better motivate the employee to voluntarily to do green designs. The framework may help the corporate to identify the key role in green megaprojects stakeholders and be better to severe value receivers. For examples, government, local residence or project owners, which depends on the different environment of the megaproject. The insights gleaned can then be applied to enhance project management practices, foster a more sustainable and responsible corporate culture, and contribute to a greener future.

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