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A LIFECYCLE-ORIENTED SNA FRAMEWORK FOR BIM ADOPTION IN MAJOR CONSTRUCTION PROJECT

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INTRODUCTION

This short paper discusses the authors' current research into a lifecycle-oriented social network analysis (SNA) framework for adopting building information modelling/management (BIM) with regard to effectiveness and efficiency in the sociotechnical systems (Cooper and Foster, 1971) of major construction project. The research methodology presented here focuses on methods, process and expected outcomes for potential contribution to knowledge advancement in BIM adoption in major construction project. Conclusions are drawn based on current research progress towards useful outcomes for both research and practice in related areas.

BACKGROUND

SNA. SNA is a popular technique to investigate social structures within a specific social environment and has been recently introduced to deal with stakeholder oriented issues in construction management (Pryke, 2012; Mok et al., 2015 and 2017) at different project stages (Chinowsky et al., 2008; AlMahmoud and Doloi, 2015; Zheng et al, 2016). The value of SNA inside a project lifecycle is that it can be used as an analytical language (Pryke, 2012) to identify the inter-organisation effect of BIM adoption within such sociotechnical systems to find solutions under challenges, especially concurrent grand challenges (Chen, 2019), which are inherent in major construction project but can probably effectively tackled by using SNA (Badi and Diamantidou, 2017) within BIM driven project management processes. It could be further assumed according to Maskil-Leitan and Reychav (2018) that it is valuable to incorporate SNA into BIM adoption in the context of productivity enhancement for anticipated benefits from the management of key issues including health, safety, quality, cost, and time, etc.

Research question. Although the value of BIM adoption has been extensively studied (Chen et al., 2019) for its strong support to integrated construction project management (Succar, 2009; Hardin and McCool, 2015, Liu et al., 2017), it is still under evaluation in terms of productivity enhancement (Chan and Ejohwomu, 2018) through quantifying its effectiveness and efficiency in major construction project – a special sociotechnical system of dedicated stakeholders.

Aim and objectives. The goal of this research is to explore a new technical solution for the identified research question. There are four milestones including identification, modelling, simulation and optimisation in connection with four research objectives (See Figure 1). Based on a preliminary literature review, the aim and objectives have been justified under the consideration to use SNA to quantitatively evaluate the effectiveness and efficiency of BIM adoption in major construction project.

RESEARCH METHODOLOGY

The new technical solution under the research aim is a lifecycle oriented SNA framework for BIM adoption in major construction project. A research roadmap towards the goal is illustrated in Figure 1, which consists of methods, milestones and objectives, and expected outcomes.

This research has four milestones in the process to achieve research objectives. The first milestone is to establish a comprehensive understanding, which is built upon project lifecycle oriented observations through literature review, case studies and interviews with experienced professionals, in order to define key factors and their dynamic relationships in the process of major project development and operation. Definitions and descriptions about key factors will then be used to form a series of SNA models for the second milestone, and those models will be established by incorporating both qualitative and quantitative measures, which are based on the generic characteristics of major construction project, and the status of one case project, which will be used for case study propose through computational simulation for the third milestone to generate new useful knowledge about critical issues influencing the effectiveness and efficiency of BIM adoption. The forth milestone is to establish some useful solutions based on optimised simulation results from SNA to support strategy and decision making in a BIM driven lifecycle process in major construction project development and operation. It is expected that this research will yield useful solutions to inform major project stakeholders regarding how productivity enhancement could be realised through improve the effectiveness and efficiency of BIM adoption.

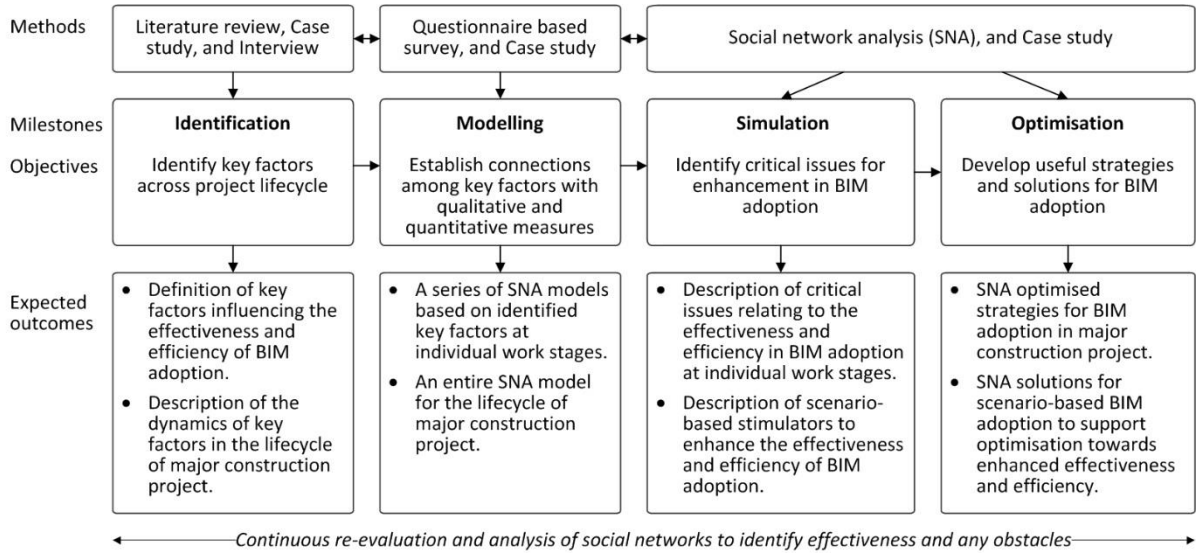

Figure 1 Research roadmap

CONCLUSIONS

This paper describes a new research initiative focusing on the use of SNA to quantify the effectiveness and efficiency of BIM adoption in major construction project through lifecycle. The research aim and objective described here have been justified through a preliminary literature review by the authors, and they are working towards the first research milestone on the research roadmap illustrated in Figure 1. Since it is an identified challenge on productivity enhancement in major construction project management, it is expected that the outcomes from this research, which relies on evidence-based computational simulation through SNA, can timely inform both research and practice with regard to the importance and solutions to improve the effectiveness and efficiency of BIM adoption in major project development and operation.

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