UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF AN ASSESSMENT TOOL FOR MULTI-ACTOR SOCIAL COLLABORATION IN BIM CONSTRUCTION PROJECTS

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ABSTRACT

The rapid advancement of Building Information Modelling (BIM) continues to influence the paradigm shift of collaboration, focusing on social collaboration among multi-actors in construction projects. There is incompetence of research in highlighting the importance of measuring the multi-actor social collaboration and no evidence of the assessment model established for multi-actor social collaboration for BIM construction projects. This research aims to establish an assessment model in measuring multi-actor social collaboration for BIM construction projects. Therefore, six objectives have been expressed: (1) to review relevant key attributes (KAs) of multi-actor social collaboration in BIM construction projects, with the intention of gaining a greater understanding of the attributes affecting multi-actor social collaboration, (ii) to identify the most significant KAs of multi-actor social collaboration in BIM construction projects, (iii) to establish suitable quantitative measures (QMs) for each KAs in measuring multi-actor social collaboration in BIM construction projects, (iv) to determine appropriate scales of performance levels for each KA in the range of poor to excellent performance, (v) to produce an assessment tool for measuring the multi-actor social collaboration practices in BIM construction projects, and (vi) to validate and demonstrate the applicability of the assessment tool in BIM construction projects. In this study, a mixed method was used for data collection, namely semi-structured interviews and the Delphi questionnaire survey. The Delphi questionnaire survey was carried out to gain the information regarding the current practices of multi-actor social collaborations by practitioners from various segments of BIM construction projects. The significant contribution of this research is in the clarification of the TEN (10) most significant KAs of multi-actor social collaboration for BIM construction projects. These KAs are (1) guidelines, standard and work process manual; (2) commitment from top management; (3) EIR; (4) readiness and awareness of mindset and culture to change among top management and multi-actors; (5) BEP; (6) understanding roles and leadership; (7) data security, privacy and ownership rights; (8) standardization practice; (9) resources; and (10) CDE based coordination. Further, this finding introduces the significance of KAs and the range of index to measure the performance index of KAs and QMs. A computerized version of the multi-actor social collaboration in BIM construction performance index (MASCOBIMPI) model tool was then developed in proprietary spreadsheet software, thereby providing an automated way of collecting, retrieving and presenting graphically data to assist in managing and monitoring performance for multi-actor social collaboration. The limitations of this research were limited to BIM construction practitioners that have experience in the construction industry and BIM construction projects. This research contributes not only to expand the knowledge in the concept of social collaboration but also for the implementation of social collaboration in BIM construction projects, particularly in Malaysia, through the developed assessment. The upcoming research can replicate the theoretical model approaches to investigate the measuring of the new variables of KAs.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Construction dominates all the other industries in the world, accounting for a sizeable proportion of the Gross Domestic Product of most countries (GDP) (Thomsen, 2008; Bon & Crosthwaite, 2000). The economic growth of many countries, especially in developing countries, is measured with reference to the tangible development of construction projects (Giang & Pheng, 2016). Thus, the construction sector has become vital and has gained more attention, especially from the governments and stakeholders where the main focus is to improve the performance of the construction industry in terms of cost, time and quality (Ofori, 2001).

According to Bui et al. (2016) and Giang & Peng (2016), the construction industry plays an important role in meeting the needs of society as it offers job opportunities and increments to the quality of life (Muhammad et al., 2017b; Faris et al., 2021) and also in helping to stabilize the economic development in the countries. It was found that the percentage of GDP for value added by construction industries is around 3.0 – 5.0 % for developing countries and 5.0 – 8.0% for developed countries (Dang & Peng, 2011; U.S. Bureau of Economic Analysis, 2018; Gloser et al., 2017 & Toth et al., 2018).

Within the context of Malaysia as one of the developing countries, her population is estimated to reach 32.4 million in 2020 and 35 million by 2030 where this will contribute to the urbanisation rate which has been expected to reach 75% in 2020 and expected to increase to 80% by 2030, where the focus will be on the conurbations of the Greater Klang Valley, Georgetown, Johor Bahru, Kuantan, Kuching and Kota Kinabalu (EPU, 2018) that indirectly will drive the Malaysian economic growth with emphasis on the wellbeing, quality of life and social equity.

Recently, in order to achieve the quality of life and social equity among residents in Malaysia, the Twelfth Malaysian Plan (12MP) (2021-2025), Eleventh Malaysian Plan (11MP) (2016-2020), Tenth Malaysian Plan (10MP) (2011-2015) and Ninth Malaysian Plan (9MP) (2006-2010) has concentrated in providing sufficient major residential housing projects and infrastructure developments (EPU, 2018; EPU, 2023).