BUILDING INFORMATION MODELLING (BIM) EXECUTION PLAN FRAMEWORK: A CASE STUDY OF PRE-APPROVED PLAN (PAP) DESIGN MODELLING PROJECT IN THE PUBLIC WORK DEPARTMENT (PWD) OF MALAYSIA

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ABSTRAK

Pembangunan Model Berinformasi atau *Building Information Modelling* (BIM) merupakan proses penyediaan, penggunaan dan perkongsian model 3D menerusi teknologi digital yang mengandungi pelbagai informasi di mana ianya dapat digunakan oleh setiap pihak yang terlibat dalam projek bagi mencapai pelbagai objektif di sepanjang fasa pelaksanaan projek. Untuk melaksanakan projek secara BIM, dokumen Pelan Pelaksanaan BIM atau *BIM Execution Plan* (BEP) perlu dibangunkan sebagai dokumen strategi perancangan, dan pemantauan bagi memastikan projek dapat disiapkan mengikut objektif, dan matlamat yang ditetapkan. BEP yang lengkap dan teratur dapat membantu pihak berkepentingan memahami, dan mencapai objektif asas penggunaan BIM. Beberapa dokumen BEP telah dibangunkan di seluruh dunia sejak tahun 2010 dan telah digunakan dalam pembangunan projek baharu. Dokumen ini harus disesuaikan dengan jenis projek, keperluan pihak berkepentingan dan objektif projek kerana BEP yang komprehensif adalah faktor utama kejayaan pelaksanaan BIM. Sementara itu, Jabatan Kerja Raya (JKR) telah menghasilkan beberapa lukisan piawai sejak tahun 1980-an. Lukisan ini digunakan dalam pelbagai projek seperti sekolah dan klinik kesihatan. Kebanyakan projek telah disiapkan dan reka bentuk bangunan ini telah memenuhi keperluan pelanggan serta pihak berkuasa meskipun terdapat beberapa pindaan telah dibuat semasa peringkat pembinaan ekoran percanggahan reka bentuk dan lukisan. Memandangkan lukisan ini boleh digunakan berulang kali, JKR telah menjenamakan semula lukisan ini sebagai Pelan Pra-Kelulusan atau *Pre-Approved Plan* (PAP) dan mengambil inisiatif untuk mengumpul dan menyimpan semua lukisan ini untuk kegunaan projek pada masa hadapan. Untuk meningkatkan kualiti lukisan PAP dan selaras dengan hala tuju pendigitalan Kerajaan, JKR telah memutuskan untuk membangunkan semula lukisan ini dalam bentuk BIM secara berperingkat. Objektif utama inisiatif ini adalah untuk menghasilkan model PAP terkoordinasi yang dapat mengurangkan kesilapan lukisan dan meningkatkan produktiviti reka bentuk dan pembinaan. Bagi melaksanakan inisiatif ini, JKR telah memutuskan untuk mengadaptasi BIM dalam Projek Pemodelan Reka Bentuk PAP. Memandangkan kesesuaian BEP sedia ada hanya tertumpu kepada pembangunan projek baharu dan tiada piawaian atau panduan untuk menyediakan BEP bagi projek sebegini, maka kajian ini telah dijalankan untuk mewujudkan rangka kerja BEP bagi Projek Permodelan Reka Bentuk PAP. Justeru, BEP yang telah dibangunkan dalam projek ini akan menjadi rujukan asas untuk mewujudkan rangka kerja BEP bagi Projek Pemodelan Reka Bentuk PAP di JKR. Oleh itu, objektif utama kajian ini adalah untuk membandingkan dan mengeksplorasi elemen utama dua puluh (20) sampel BEP sedia ada. Objektif kedua pula untuk mengeksplorasi elemen utama BEP Projek Pemodelan Reka Bentuk PAP. Manakala objektif ketiga ialah untuk mewujudkan rangka kerja BEP yang sesuai untuk Projek Pemodelan Reka Bentuk PAP berdasarkan dua puluh (20) sampel BEP dan kajian kes penggunaan BEP dalam Projek Pemodelan Reka Bentuk PAP. Metodologi kajian adalah kualitatif yang melibatkan pengumpulan data, perbandingan sampel, analisis data dan sesi temubual. Pengumpulan data melibatkan sampel beberapa BEP yang mana dikaji sebagai asas perbandingan. Manakala sesi temubual melibatkan ahli pasukan Projek Pemodelan Reka Bentuk PAP. Penemuan kajian menumpukan perbandingan elemen utama BEP dalam kesemua sampel. Akhir sekali, kerangka kerja BEP dihasilkan berdasarkan perbandingan dan analisis yang dijalankan ke atas kesemua sampel tersebut. Cadangan penambahbaikan disyorkan di akhir kajian yang meliputi penambahbaikan BEP dan potensi penghasilan BEP dalam pelbagai projek yang boleh dijadikan rujukan oleh penggiat industri pembinaan.

ABSTRACT

Building Information Modelling (BIM) is a process of preparing, using, and sharing 3D models through digital technology that contains various formats that can be used by every party involved to achieve multiple objectives throughout the project implementation phase. BIM is a new method in construction projects to enhance project delivery systems. Hence, BIM Execution Plan (BEP) must be developed as a planning and monitoring strategy document to ensure all project deliverables are completed according to the project goals. A proper BEP helps stakeholders understand and achieve the underlying objectives of using BIM. Several BEPs have been developed worldwide since 2010 and used in new project development. This document is tailored to suit the type of project, stakeholder requirement, and project objectives to ensure BIM implementation success. Meanwhile, Public Works Department (PWD) has produced a lot of standard drawings since the 1980s, which have been used previously in many projects such as schools and health clinics. Most of the projects have been completed and the building's design has filled client and authority requirements though some of the amendments to the plan and drawing discrepancies have been made during the construction stage. Since these drawings can be used several times, PWD has rebranded these drawings as a Pre-Approved Plan (PAP) and took the initiative to collect and preserve all these drawings for future project use. To enhance the quality of the PAP drawing and align with government digitalisation's agenda, PWD has decided to migrate these drawings to the BIM model staggered by several stages. The main objective is to produce the PAP coordinated model, which can reduce drawing mistakes and increase design and construction productivity. Hence, the PWD has decided to implement BIM in the PAP Design Modelling Project. Considering the existing BEP focuses only on new project development, and there is no standard or guide to prepare the BEP for this type of project, this research has been conducted to establish the BEP framework for PAP Design Modelling Project. Therefore, the main objectives of this study is to compare and explore the key elements of twenty (20) existing BEP samples. Second objective is to explore the key elements of the PAP Design Modelling Project's BEP, and lastly the third objective is to establish the suitable BEP framework for PAP Design Modelling Project based on twenty (20) BEP samples and PAP Design Modelling Project’s case study. The research methodology is qualitative: data collection, content analysis, sample comparison and interviews. The data collection consists of the BEP samples, which was reviewed as a fundamental comparison. The interview session involved the team members in PAP Design Modelling Projects. The research findings compare the key elements in BEP samples and BEPs provided in the case study. Hence, the BEP framework defined and validated based on comparing and analysing BEPs. The improvement recommendation has covered the enhancement of the BEP and the BEP development for other types of projects, which can help the construction industry player to expand the potential of BIM usage in various projects.

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