The Impact of Building Information Modeling on user's Behavior and It's reflection on Building Performance in Construction Industry in Libya

By

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Thesis Submitted in Fulfilment as the Requirement for Doctor of Philosophy (Built Environment) by Research Degree in the Faculty of Architecture and Built Environment

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Infrastructure University Kuala Lumpur or other institution.

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Abstract of the thesis presented to the Senate of Infrastructure University Kuala Lumpur in fulfilment of the requirement for the degree of Doctor of Philosophy Built Environment

THE IMPACT OF BUILDING INFORMATION MODELING ADOPTION ON USER'S BEHAVIOR AND IT'S REFLECTION ON BUILDING PERFORMANCE IN CONSTRUCTION INDUSTRY IN LIBYA

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Every evolution in technology has been achieved with advances in computer science. The result of each evolution is to provide more information to attain objectives easily. The present study employed primary data approach using questionnaire to survey the current situation of BIM adoption. A hypothesized model of BIM adoption configured as the interaction of CSFs, BIM adoption and B P. There were four hypotheses tested as pathway of exogenous, mediating and endogenous variables. The discussion analyses the main relative merits of using BIM and attempts to forecast their future. (Quantitative methodology using descriptive approach was employed. Using simple random sampling. SEM technique using Analysis of Moment Variance (AMOS) succeeded in establishing and validating an empirical model of BIM adoption in the construction industry in Libya. 1st order CFA, CFA, hypothesised model, generated model and re-specified model analysis succeeded in validating the detailed measurements. AMOS using technique, the succeeded in testing the mediating effect of BIM adoption the relationship between CSFs and BP. Interaction effect analysis between predictors and the mediator succeeded in explaining BP as endogenous variable. Path Analysis of Re-Specified model confirmed a direct positive significant influence of CSFs on the BIM adoption and BP. As achievement of research objectives, the CSFs succeeded in explaining BIM adoption, and confirmed BIM adoption as mediating variables. The present study concludes that CSFs should be considered as the main concern to predict BIM adoption for future Improvement of

Building Performance. Through re-specified model analysis, the present study has a fundamental finding to the body of knowledge to configure an interaction of CSFs as predictors on the BIM adoption and Building Performance in the significant structural model.

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APPROVAL

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LIST OF ABBREVIATIONS

APPS	Application System
AEC	Architecture, Engineering, and Construction
AIA	American Institute of Architects
AMOS	Analysis of Moment Structures
BI	Behavioral Intention
BIM	Building Information Modeling
BREEAM	Building Research Establishment Environmental Assessment Methodology
CAD	Computer-Aided Design
CEO	Chief Executive Officer
CFA	Confirmatory Factor Analysis
CIO	Chief Information Officer
CSE	Computer Self-Efficacy
DF	Degree of Freedom
EIT	Engineer In Training
EOU	Ease of Use
GFI	Goodness of Fit Index
IBM	International Business Machines
ICTs	Information and Communication Technologies
IS	Information Systems
IT	Information Technology
MIS	Management Information System
OD	Organization Development
PBC	Perceived Behavioral Control
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SMS	Senior Management Support
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TII	Theory of Information Integration
TLI	Tucker Lewis Index

TPB	Theory of Planned Behaviors
TRA	Theory of Reasoned Action
PU	Perceived Usefulness

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Building Performance (BP) associated with process of technology adoption is now becoming increasingly required and it has to be delivered and implemented in a sustainable manner (Gegana and Widjarnarso, 2015). Information Communication and Technology (ICT) has revolutionised the building design and the adoption of advanced modeling technologies in building design (Cao, et al., 2016). One of the latest technologies is Building Information Model (BIM). The present study identifies through a comprehensive literature review of the Critical Success Factors (CSFs) affecting BIM adoption (Zou, Kiviniemi and Jones, 2016; Nguyen, Shehab and Gao, 2010).

This study proposes an empirical model that examines these factors (Exogenous variables) "Senior Management Support (SMS), Training (T), User Trust(UT), User Experience(UE), Technical Support(TS), User Involvement(UI), Perceived Usefulness(PU), Perceived Ease of Use (PEU)" and Endogenous variables " Building Information Model (BIM), Building Performance (BP) that affecting the level of adoption and concerning the details involved in BIM for design construction in Libya. This proposed empirical model tested using Structural Equation Model (SEM). This model is expected to give guidelines for engineers, designers, developers and practitioners in the construction industry as well policy maker and stakeholder in the mentioned field (Newton and Chileshe, 2012).

Furthermore, with a rapid development of technological revolution, economic globalization and the fundamental change of social production method, human capital and social capital has become the key factor for a business organisation to the achievement of competitive advantage (Fang, et al., 2016). Management Information System (MIS) is charged with improving the performance of organisations and people through the employ of information technology. MIS is a multifaceted discipline, which

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