-THE COST BENEFITS OF BUILDING INFORMATION MODELING (BIM) IN MALAYSIAN CONSTRUCTION INDUSTRY

CHIN LI WEI

UNIVERSITI TEKNOLOGI MALAYSIA

THE COST BENEFITS OF BUILDING INFORMATION MODELING (BIM) IN MALAYSIAN CONSTRUCTION INDUSTRY

CHIN LI WEI

A project report submitted in fulfilment of the
requirements for the award of the degree of
Master of Engineering (Construction Management)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2017

Thank you for everything…

ACKNOWLEDGEMENT

In accomplishing to completion of this project report, I had interfered with many generous people who willing to provide me a lending hand. Undoubtedly, they have contributed significantly in expanding my comprehensions and thoughts. To be precise, I wish to express my utmost appreciation to my main project supervisor, Dr. Chai Chang Sa'ar, for encouragements and guidance associated along the path.

I also want to extend my appreciation upon my panels for their guidance, advices and comments for further improvements. Without their patient understandings and interests, this thesis would not have been a qualified piece.

My sincere gratitude also extends to all my coursemates and others who have provided assistance at various occasions. Their willingness and lending hands are cherished. Last appreciation to all my family members who portraying constant supports and encouragements.

ABSTRACT

The construction industry is classified as one of the industries with continuous hectic growing vis-à-vis its unique characteristics and uncertainties throughout the project lifecycle. To march forward, the industry is embracing numerous advanced information technology approaches and concepts such as Building Information Modeling (BIM) which intends to promote full integration and collaboration among all stakeholders. Despite the advantages exemplified from this paradigm, the reluctance of implementation by the local construction industry remains as the strongest obstacle. Therefore, this paper aims to evaluate the workability and applicability of BIM in the Malaysian construction industry, in terms of its potential cost implication and benefits; with the objectives to examine the significances and relevant cost benefit elements of BIM investment in industry. To generate thorough and acceptable outcomes, interviews are conducted with the limelight shed upon the BIM-related projects to depict the genuineness and reality-portrayal, in terms of opted cost benefits elements. The data collected from the interview session are analysed by utilizing framework analysis approach. The results exemplified BIM implementation level in Malaysian construction industry in relation to its actual practices and cost benefits. This paper stressing on the preliminary stage of a research plan, aiming to comprehend the perceived value of BIM in the Malaysian building industry. A BIM reference framework is also developed to depict as a guideline for interested adopters to envisage effective BIM adoption planning and future forethoughts.

ABSTRAK

Industri pembinaan diklasifikasikan sebagai industri yang berterusan dan sibuk berkemban, sehubungan dengan ciri-ciri yang unik dan ketidaktentuan sepanjang hayat projek. Oleh itu, industri ini harus menerap banyak pendekatan teknologi maklumat dan konsep baru seperti Building Information Modeling (BIM) yang dapat menggalakkan integrasi yang tinggi dan kerjasama di kalangan semua pihak yang berkaitan. Walaupun banyak manfaat ditonjolkan dari applikasi ini, keengganan untuk menerima BIM oleh industri tempatan kekal sebagai halangan yang paling besar. Oleh itu, projek ini bertujuan untuk menilai kebolehkerjaan BIM dalam industri pembinaan Malaysia, dari segi potensi kos implikasi dan manfaat, sejajar dengan objektif-objektif untuk mengkaji kepentingan-kepentingan dan elemen-elemen kos yang berkaitan dengan aplikasi BIM dalam industry. Untuk menjana hasil yang berkualiti, temu bual dijalankan kepada kakitangan yang pernah atau sedang mengambil bahagian dalam projek-projek BIM-untuk menggambarkan ketulenan dan reality kerja, dari segi elemen-elemen kos. Data yang dikumpul akan dianalisis dengan menggunakan pendekatan "*framework analysis"*. Hasil penyelidikan menonjolkan tahap pelaksanaan BIM dalam industri pembinaan di Malaysia sejajar dengan amalan sebenar dan faedah kos. Projek ini menekankan pada peringkat awal rancangan penyelidikan, dengan tujuan untuk memahami penghargaan BIM dalam industri pembinaan di Malaysia. Satu rangka kerja BIM juga disediakan sebagai panduan untuk pelabur yang berminat untuk membuat perancangan dalam pelaburan dan adopsi BIM yang efektif dan potensi perancangan masa depan.

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11MP	-	11th Malaysia Plan
2D	-	Two Dimensional
3D	-	Three Dimensional
4D	-	Four Dimensional
5D	-	Five Dimensional
6D	-	Six Dimensional
AEC	-	Architecture, Engineering, and Construction
BIM	-	Building Information Modeling
CAD	-	Computer-Aided Design
CBA	-	Cost Benefit Analysis
CIC	-	Computer Integrated Construction
CIDB	-	Construction Industry Development Board
CIMP	-	Construction Industry Master Plan
CREAM	-	Construction Research Institute of Malaysia
DBMS	-	Database Management Systems
HVAC	-	Heating, Ventilation and Air Conditioning
IBS	-	Industrialised Building System
ICT	-	Information and Communications Technology
IPD	-	Integrated Project Delivery
LAD	-	Liquidated Ascertained Damages
MSC	-	Multimedia Super Corridor
NCI	-	National Cancer Institute
NKEAs	-	National Key Economic Areas
OSM	-	Off-Site Manufacturing
PAM	-	Pertubuhan Akitek Malaysia

PPP	-	Public Private Partnership
PWD	-	Public Works Department
RICS	-	Royal Institution of Chartered Surveyors
ROI	-	Return on Investment
UTM	-	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

The building industry is classified as one of the industries with continuous hectic growing and tempting profits offer due to its unique characteristic in fragmented organizations, production period, working conditions and labor intensive activities (Forbes, 2015; Sageworks, 2015). One of the salient factors in guaranteeing a successful completion of building project is integration and collaboration of multidisciplinary professionals, especially architect, engineers, contractors and as like. Thus, the mutual collaboration and appreciation within architecture, engineering, and construction (AEC) industry are of salient and decisive. Building information modeling (BIM), an advanced technology and associated set of procedures to produce, communicate, and analyze building models (Eastman et al. 2008), is an enabler that may contribute to the building industry in productivity enhancements and integration guarantee.

BIM can be interpreted as integration and consolidation of different stakeholders at distinguish phases of the life-cycle of a facility to input, extract, update or modify any relevant information within the model to portray the obligations and roles of that stakeholder (Zahrizan et. al., 2013b; Enegbuma et.al., 2014). It is characterised as an information-rich, object-oriented, intelligent and parametric digital representation of the physical product (Official Portal CIDB Malaysia, 2015; Mohd Harris, 2015).

Ineluctably, the model is a shared digital representation established on open standards for interoperability (Aryani et.al., 2013; Enegbuma et.al., 2014; Usman et. al., 2015). BIM incorporates product and asset data into a 3D computer model, enabling the keep tracking of a project from cradle to grave. Contemporaneously, other elements that have been embedded to modelling include "4D" – the review of planning and sequencing; "5D" – the costs associated with the model including building materials, and "6D" – bringing together the model as one, and looking at service management (Sooraj Shah, 2013; BIM Center, 2015). BIM capability of knowledge resource sharing ineluctably guarantees acute accuracy and precipitates the information flow which eventually, alleviates expenses incurred due to lack of interoperability, automation of monitoring and evaluation and associated operation and maintenance works which in coherent with the IPD in construction practices (Sacks et al., 2010; Syed Shujaa et. al., 2013; Usman et. al., 2015).

The AEC industry is experiencing massive technological and institutional transformations and challenges such as the massive entry of information technology and the incorporation of sustainable practices (Becerik-Gerber and Kensek, 2009; Becerik-Gerber et. al., 2011). The deployment of computer-based technology in construction, particularly BIM, will result a more efficient, effective, flexible, and innovative industry, while concurrently, enhancing the national productivity (Muafi et. al., 2012; Mattsson and Rodny, 2013; Zahrizan et. al., 2013b; Mohd Harris et.al., 2014b; Mohd Harris, 2015; Official Portal CIDB Malaysia, 2015). Application of BIM guaranteeing the project success through its associated capabilities and conveniences within design assistance and constructability, scheduling and sequencing, cost estimating, system coordination, modelling and visualization, layout and fieldwork, and clash detection (Aryani et.al., 2013; Aftab et. al.,2014; Enegbuma et.al., 2014; Usman et. al., 2015). To achieve that, it is paramount for the integration of information to be sparkled at the initial stage before the project commenced (Mohd Harris et.al., 2014b; Usman et. al., 2015).

The intention to implement BIM in Malaysia was initiated by the Director of Public Works Department (PWD) in 2009. Originally, the intention that led to BIM introduction was to maximize investment value throughout the development plans;

while simultaneously, incorporate the employment of distinguished ICT solutions in its strategies. Its introduction was also triggered with the government's awareness of the potential of BIM to mitigate construction cost and decimate associated design problems in planning phase (Zahrizan et. al., 2013b; BIM Center, 2015). Inevitably, BIM is been embraced as both a new tool and new process, but contemporaneously, it is associated with changes to people, processes, communication and work culture, directly or indirectly (Aryani et.al., 2013; Zahrizan et. al., 2013a; Enegbuma et.al., 2014; Mohd Harris et.al., 2014a).

1.2 Problem Statement

Continuous, accurate, and real-time information transferring and sharing among project participants is crucial in conflicts resolution, speedy solutions generation, completion time guarantee, while contemporaneously, budget compliance. Contrary, poor interoperability and improper project management in building industry are the decisive factor lead to project failure. Kymmell (2008) claimed that the main cumbersome in the planning and construction of building project is the inaccurate visualization of the project information as the details are the evil roots of the confusion. Whereas Eastman et. al. (2008) discovered the fragmentation occurred in actual facility delivery process, the heavy reliance upon paper-based mode of communication where lapses and exclusions existed within these documents undoubtedly incurred unexpected field costs, delays and eventual lawsuits among the different players involved, conflicts, and even economic losses and setbacks

Contemporaneous with the Malaysian agenda in the 12 National Key Economic Areas (NKEAs) to precipitate and enhance business growth in the AEC industry, new technologies are being introduced and aggressively embraced to guarantee competitive advantage within the current market (Alshawi et. al., 2010). BIM, as one of the new emerging technologies, can be deployed in the various project phases such as design, construction and project management to facilitate and ease the exchange and interoperability of information in digital format. Despite the advantages

exemplified from this paradigm, reluctance of implementation of such technology within project delivery process by local construction industry is still strong (Shuratman, 2012).

Although BIM has been existed in the market for years, its adoption within industry is of not to the fullest capacity. Inevitably, the associated technology, process and organizational investments required to initiate BIM are of pretty penny, and contemporaneously, its implementation requires substantial changes to the traditional way in designing and building projects (Becerik and Pollalis 2006). An enhancement in the availability of financial information will be decisive, as the decision of those professionals to adopt new technologies is proportional to the associated opportunity they capable to gain in the operations (Bjork, 2003). As the building industry implements BIM, decision makers and end users are capable to benchmark and appreciate the value of BIM to their organizations and projects.

The Malaysian governments' vision to emerge as a developed nation and the desire to export construction services to India and South-East Asia intertwined with government-to-government projects inevitably favors BIM propagation. Similar industries like Hong Kong still steadily remained at primary implementation stage despites vast amount of researches were executed on BIM (Zhang et. al., 2013). Singapore similarly, has experienced such technological advancement in BIM. Thus, to surmount other countries and outstanding, earlier adoption and utilisation are the salient key. Design technology is the key to affordance of a project hence, integration and collaboration should commerce at the earliest possible stage. BIM implementation will initiate transformation to technology, people and processes or policy (Succar, 2009; Wong et. al., 2011; Aryani et.al., 2013). BIM study is not restrained to modifications and innovations in various fields of user perception, but contributing in health and safety, costing, project management, green building, Off-Site Manufacturing (OSM), Integrated Project Delivery (IPD), self -help housing, real estate and as like (Enegbuma et. al., 2014).

The comparatively low productivity rate portraying by the Malaysian construction industry is a reflection of the limited modernisation of construction practices and poor adoption of information technologies within the industry (Zahrizan et. al., 2013a; Mohd Harris, 2015). According to a survey carried out by the CIDB, only 5% of construction firms in Malaysia is utilising BIM (CIDB Malaysia, 2015). From the analysed results by Aftab et. al. (2014), it clearly depicted the implementation rate of BIM in Malaysia was in very unsatisfactory manner. Further scoped down, only 21.1% BIM usage shed light on project conceptualization; 48.4% applied it solely on design phase; 4.2% on project execution; and 26.3% applied BIM thoroughly (all phase) in project. Such phenomenon needs to be urgently addressed to enhance its overall application.

The unsatisfied adoption percentage can be justified as the AEC industry, often acknowledged as a low-technology and an inefficient industry (Gallaher et al., 2004). Pena (2011) also stated that the delivery process in the AEC industry was fragmented and lack of uniformity, and ineluctably, the industry relied heavily upon 2D paper-based drawing as the medium of communication. The associated obstacles of BIM adoption and implementation need to be outlined and addressed so ensure the smoothness in embracing BIM implementation. To encourage the appreciation upon BIM, its tailing benefits should be also appropriately apprehended and enhancements can be improved based on intended focus or field of development.

This paper sheds light on the workability and applicability of BIM, aiming to understand the perceived value of BIM in the Malaysia building industry and thus emerge as a benchmark for future studies.

Based on the issues elucidated above, some queries are initiated:

1. What are the significances of BIM adoption?

2. What are the barriers to the BIM penetration?

3. How BIM investments have been valuable to Malaysian building industry?

4. How could BIM contribute to cost benefits of building construction?

1.3 Aim and Objectives

Undeniably, there are abundant available resources and publications regarding the BIM status in Malaysian AEC industry. However, the insufficiency that arose is the lack of actual tabulations or outcomes that can generally sum up the perceive value of BIM in Malaysia, due to the discrepancies and lack of available samples that can be utilized to draw the baseline that is commonly acceptable. From the research questions exemplified above, this study aims to evaluate the workability and applicability of BIM in the Malaysian construction industry; in terms of its potential cost implications and benefits.

Therefore, the objectives are formulated as follow:

1. To examine the significances of BIM investment in industry.

2. To evaluate the cost benefits of building construction through BIM implementation.

3. To develop a BIM performance evaluation framework in AEC.

1.4 Scope of Study

There are abundant related papers and researches related to BIM study, within Malaysia or internationally. If narrowed down to within Malaysia, undoubtedly, there were still many available sources and publications. However, there is lack of researches that incorporated the actual BIM implementation, especially government projects that can be utilized as common acceptable baseline. Every BIM adoption

portrayed by private sector or even individual sector within AEC industry possessed its very own reasoning and to be achieved desires, which such reasoning is not suitable to solely conclude the expected outcomes. It might be due to the available pilot projects proposed by government are not available previously, thus the related studies are less available, and thorough judgements cannot be made or properly estimated.

The construction industry is hectic and equips with uncertainties throughout the project lifecycle. As pinpointed above, the implementation of BIM application is equipped with abundant possibilities and outcomes, which inevitably, creating a new path in efficiency enhancement, in contemporaneously in nurturing a healthier construction culture. The salience and decisiveness of integration and interoperability are to be appreciated; and it is even crucial to value their togetherness and maximize the underlying potentials. However, to emphasis the workability and applicability of BIM to Malaysian construction industry, it is preferred to enforce local actual scenario to current study.

There were plenty papers regarding the advantages of BIM, its obstacles and as like, but mostly shed light upon personal opinions, perspectives, and preferences; but not based on the actual reflections of overall implementation, or just as previously mentioned, only served ones organisation's objective. By incorporating the local scenarios into study, ineluctably it will portray the insufficiency and inadequacy in BIM application; and contemporaneously, to what extent BIM was being implemented in current construction project. This study is intended to boost comprehension and concentration on realistic-concern to generate the outcomes that parallel with real practices. After that, a framework will be prepared to exemplify the connections that can be sparkled between BIM and construction practices to serve as a guideline reference.

A review was conducted on the past researches and BIM related papers, to gather the possible interactions and connections that are being sharing by BIM and current construction practices. The availability and relevant justifications are highlighted to identify the necessity of current research; and the limitations and

insufficiencies that need to be identified urgently for the social and national interests are pinpointed to depict the salience of such research. The intended limelight are shed upon 'Perceived Value of BIM' and 'Cost Benefits of BIM'. The former is salient to be determined as there exists no such related focus of BIM in Malaysia, which take into account the actual projects implementation and portrayal; the latter is crucial as there is no relevant studies that can serve as a baseline to calculate cost benefits of BIM in Malaysian construction industry. Table 1 depicted the previous constructed studies that are relevant and formulated a new territory that can be further exploited as current study does.

By reviewing these available possibilities and gaps, a suitable direction of study is decided. From available papers and literature obtained, they were been compared to identify its salience and priority concern by industry players. To evaluate the workability and applicability of BIM in Malaysian construction industry, it was decided to opt for projects which incorporated BIM application along the project delivery process. This was arranged to better appreciate the inherent practical issues in the application of BIM in concurrently to guarantee the synergy of the to-be-proposed framework.

Starting from scratch, any contradictions and deviations will be highlighted and pinpointed. The main capabilities and barriers associated in BIM implementation will be identified and ranked based on their decisiveness. Undoubtedly, how BIM application will contributed to local building industry will be connected too. Next, limelight will be shed upon how BIM will positively contribute to cost benefits of building construction. To fulfill the queries and ensure reliability guarantee, interviews are conducted with the limelight shed upon the completed government-proposed projects, to depict genuineness and reality-portrayal, which contrary with previous papers which elucidated opinion-related. To generate thorough and acceptable outcomes, this study will be directed to personnel that appreciate and participating/ed in BIM application in order to guarantee the genuineness and accuracy. The data collected from the interview session are analyzed by utilizing framework analysis approach. The results exemplified BIM implementation level in Malaysian construction industry in relation to its actual practices and cost benefits. A

meaningful BIM reference framework is also developed to depict as a guideline for interested adopters to envisage effective BIM adoption planning and future forethoughts.

Table 1.1: Previous Related Studies

	TITLE	AUTHOR	PURPOSE/ INTENTION
PERCEIVED VALUE OF BIM	The Perceived Value of Building Information Modeling in the U.S. Building Industry	Burcin Becerik-Gerber (2010)	The study aims to understand the perceived value of BIM in the U.S. building industry, as seen by various participants in the industry.
	Current Use of Building Information Modelling Within Australian AEC Industry	Ahmed Alabdulqader, Kriengsak Panuwatwanich And Jeung-Hwan Doh (2013)	The aim of the research presented in this paper was to provide an updated view on the current practices on the use of BIM within the Australian construction industry.
	The perceived business value of BIM	S. Vass & T. Karrbom Gustavsson (2014)	The purpose of this paper is to explore how actors in the Swedish construction industry perceive the business effects of BIM, but also what organizational prerequisites need to be in place for value creation in BIM.
	Building Information Modeling (BIM): Trends, Benefits, Risks, and Challenges for the AEC Industry	Salman Azhar (2011)	In this paper, current trends, benefits, possible risks, and future challenges of BIM for the AEC industry are discussed.
	The project benefits of Building Information Modelling (BIM)	David Brydea, Martí Broquetasb, Jürgen Marc Volm (2013)	The purpose of this paper is to explore the extent to which the use of BIM has resulted in reported benefits on a cross-section of construction projects.
	Building Information Modeling in Architecture, Engineering, and Construction: Emerging Research Directions and Trends	Burcin Becerik-Gerber; and Karen Kensek (2009)	This paper focuses on research directions and trends around BIM through interdisciplinary endeavors: how BIM research topics could be explored; their relevancy; and their potential future impact.
	Benefits and Barriers of Building Information Modelling	Han Yan and Peter Damian (2008)	This paper describes the Perceived benefits and barriers of BIM adoption in AEC industry.
	BIM Experiences and Expectations: The Constructors' Perspective	Kihong Ku & Mojtaba Taiebat (2011)	This paper aims to understand the current level of BIM expertise and strategies of construction companies and their expectations.
	Potentials and Barriers for Implementing BIM in the German AEC Market	Petra von Both (2012)	Analysis of the potentials and barriers in the implementation of BIM in the German building industry and deduction of an action plan to improve the competitive situation

Table 1.1: Previous Related Studies (cont'd)

PERCEIVED VALUE OF BIM

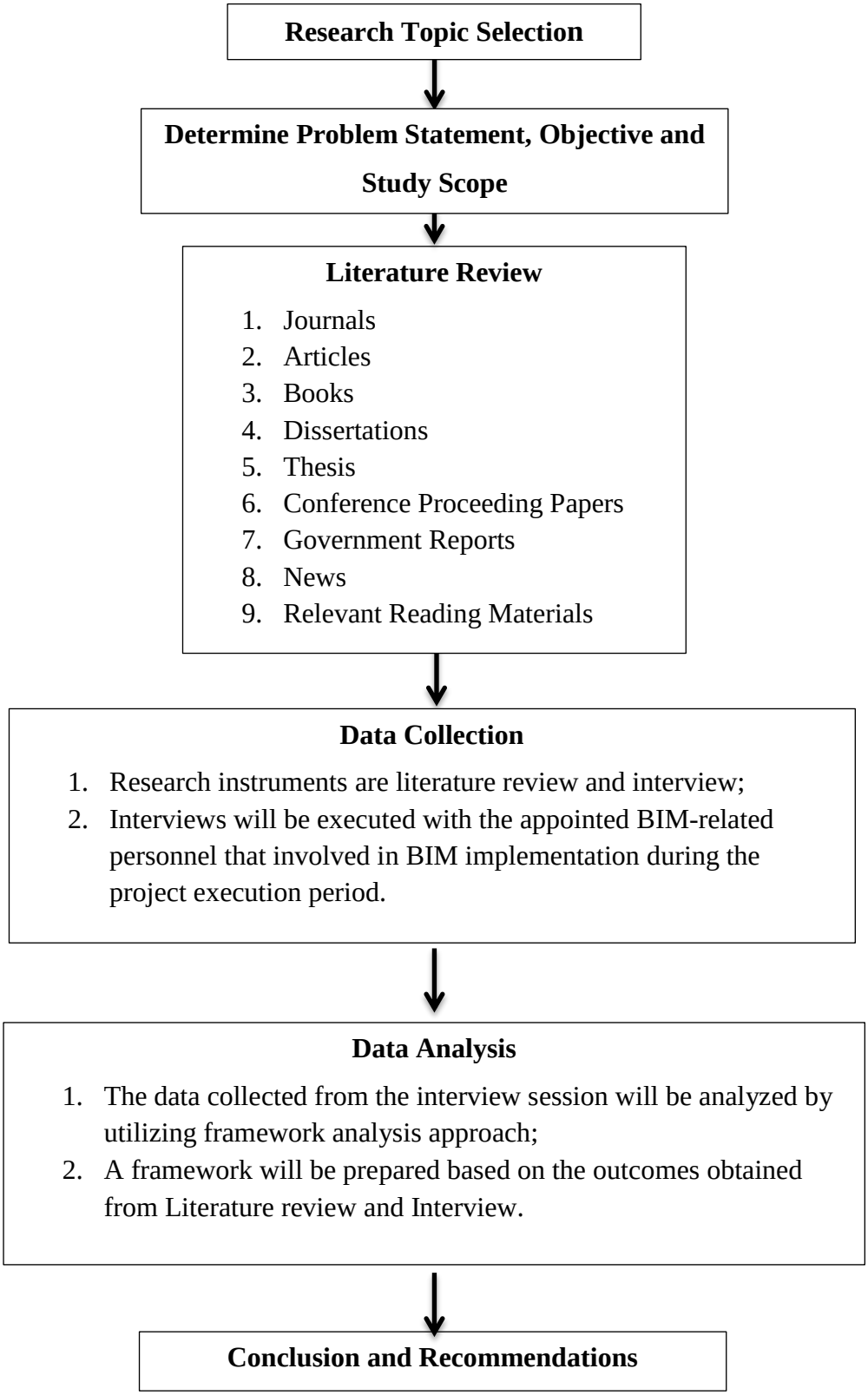
TITLE	AUTHOR	PURPOSE/ INTENTION
Building Information Modeling (BIM): A new paradigm for quality of life within Architectural, Engineering and Construction (AEC) industry	Roshana Takim, Mohd Harris, Abdul Hadi Nawawi (2013)	This paper seeks to identify determinant factors and implementation gaps of BIM in the AEC industry.
A Preliminary Study on Building Information Modelling (BIM) Implementation in Malaysia	W. I. Enegbuma1 and K. N. Ali (2011)	This paper presents findings from a preliminary study done to evaluate the state of present BIM policies, technological know-how, level of usage, barriers and suggestions on the state-of-the-art of BIM in Malaysian construction industry.
Preliminary building information modelling adoption model in Malaysia: A strategic information technology perspective	Wallace Imoudu Enegbuma, Uche Godwin Aliagha, Kherun Nita Ali (2014)	This paper aims to investigate the relationship between BIM adoption from the perspectives of people, process and technology to strategic information technology (IT) in construction mediated by collaborative processes for new BIM entrants.
Exploring the Barriers and Driving Factors in Implementing Building Information Modelling (BIM) in the Malaysian Construction Industry: A Preliminary Study	Z., Zahrizan; Nasly, Mohamed Ali; Ahmad, Tarmizi Haron; Amanda Marshall-Ponting; and Zuhairi, Abd. Hamid (2013)	It warrants a study to determine what are the actual barriers that hamper its implementation and what are the driving factors that could enhance its pace of implementation in the Malaysian construction industry.
The Way Forward for Building Information Modelling (BIM) for Contractors in Malaysia	Mohd Harris, Adi Irfan Che Ani, Ahmad Tarmizi Haron and Afifudin Husairi Husain (2014)	This paper seeks to investigate the barriers, potential solutions and benefits of implementing BIM for contractors in Malaysia.
Prioritizing Building Information Modeling (BIM) Initiatives for Malaysia Construction Industry	Mohd Harris, Adi Irfan Che Ani, Ahmad Tarmizi Haron, Christopher Preece, and Afifudin Husairi Husain (2014)	This paper describes ideas and issues around the development and prioritizing the BIM initiatives to be undertaken in Malaysia construction industry.
The Malaysian Government's Initiative in Using Building Information Modelling (BIM) in Construction Projects	Aryani Ahmad Latiffi, Juliana Brahim, Suzila Mohd, and Mohamad Syazli Fathi (2014)	This paper aims to explore those initiatives in promoting and encouraging construction players to use BIM.
Application of Building Information Modeling (BIM) in the Malaysian Construction Industry: A Story of the First Government Project	Aryani Ahmad Latiffi, Suzila Mohd and Juliana Brahim (2015)	This paper discusses the application of BIM in the project National Cancer Institute (NCI), the first project launched by the Malaysian government.
BIM in Malaysian Construction Industry: Status, Advantages, Barriers and Strategies to Enhance the Implementation Level	Aftab Hameed Memon, Ismail Abdul Rahman, Irfana Memon and 1Nur Iffah Aqilah Azman (2014)	This study aims to assess current status of BIM implementation in Malaysian construction industry. It also investigated advantages and disadvantages together with barriers to implement BIM and proposing effective strategies to enhance its implementation.
Exploring the Adoption of Building Information Modelling (BIM) In The Malaysian Construction Industry: A Qualitative Approach	Z. Zahrizan, Nasly Mohamed Ali, Ahmad Tarmizi Haron, Amanda Marshall-Ponting, Zuhairi Abd Hamid (2013)	This study was conducted as an exploratory study through literature review and interviewing the organisations that have had BIM experience.
Hypothesis Analysis of Building Information Modelling Penetration in Malaysian Construction Industry	Wallace Imoudu Enegbuma and Kherun Nita Ali (2013)	This paper presents a continuation of the theoretical framework developed, to further investigate the relationship for BIM penetration from perspectives of people, process and technology to strategic IT in construction and collaborative construction.
Building information modelling (BIM) framework for practical implementation	Youngsoo Jung, Mihee Joo (2011)	The purpose of this paper is to propose a BIM framework focusing on the issues of practicability for real-world projects.

Table 1.1: Previous Related Studies (cont'd)

	TITLE	AUTHOR	PURPOSE/ INTENTION
COST BENEFITS OF BIM	BIM Investment: Understanding Value, Return And Models Of Assessment	Jupp, J. R. (2013)	This paper reviews existing research surrounding BIM, its value, the return on investment (ROI) and models of assessment.
	Building information modelling demystified: does it make business sense to adopt BIM?	Guillermo Aranda-Mena, John Crawford and Agustin Chevez (2009)	The purpose of this paper is to inform project management practice on the business benefits of building information modelling (BIM) adoption.
	Return on Investment Analysis of Using Building Information Modeling in Construction	Brittany K. Giel1 and Raja R. A. Issa (2013)	This paper aims to facilitate the decision-making process in the adoption of BIM by presenting the cost savings associated with implementing BIM.

1.5 Research Methodology

Table 1.2 Flow Chart of Research Methodology



1.6 Significance of the Study

The 21st century construction players are expected to deal with a rapid pace of technological change, a highly interconnected world, and complex problems that require multidisciplinary solutions. Both architecture and engineering professions are embracing new modes of interdisciplinary information sharing and focusing on emerging and fast growing concepts: Building Information Modeling (BIM).

BIM is a business process supported by technology. To optimize use of the technology, it is decisive and necessary to deploy the process. It is absolutely critical to appreciate and utilize BIM as in construction industry, the conventional acceptable project delivery process applies technology in isolation; on the contrary, the BIM process employs technology in collaboration.

Early espousal and adoption of the new processes and technologies inevitably will be visible with the massive increase in productivity and quality that will equip them to meet the challenge of lower priced competitions whilst maintain the profit levels. Vice versa, those missed the golden timing to adopt will eventually associate with the mitigation in their competitive advantage; and eventually, will be surmounted by other well-prepared players.

Ultimately, by embracing BIM technology, it will ensure that the nation is at the vanguard of a new digital revolution that will stimulate new efficiencies, innovation and perhaps most crucially, national growth. As mentioned earlier, there was lack of study regarding the actual integration as propagandise by BIM application, as Malaysia is still at the initiation phase where the outcomes are tailing with unknown possibilities. Limelight always shed upon BIM application that it will positively emerge as a salient tool for further enhancements and could precipitate the development of construction industry. However, the applicability and genuineness of such statement need to be clearly indicated. In Malaysia, the industry is initiating its baby steps in BIM usage, which ineluctably, it is a golden opportunity to incorporate and integrate good practices within its application, to cultivate healthier construction

industry, while contemporaneously, maximise the associating pros. However, the starting point is always the cumbersome part, as without proper planning or the incorporation of unsuitable tasks might cause adverse effect or result in ineffective or pointless flow. Thus, with the preparation of this framework, it is targeted to serve as a baseline and reference guideline for the interested parties to apply BIM at the most cost beneficial way.

This paper stressing on the preliminary stage of a research plan, aiming to comprehend the perceived value of BIM in the Malaysia building industry and thus to provide a benchmark for future studies. The effective means from the benchmarks available locally (if any) and internationally for implementing BIM in different stages of lifecycle in Malaysia. With proper appreciation and gratitude, it is inescapably will encourage the formation of better industry practice and culture.

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