BARRIERS TO AUGMENTED REALITY APPLICATION IN CONSTRUCTION: AN EXPLORATORY STUDY IN MALAYSIA

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Abstract

Malaysian construction industry is always labelled as ancient industry because of resistance to change or adopt new technology in their working process. The construction industry in Malaysia is slow in adopting new technology compared to other industries. Therefore, it has a bad reputation for producing good quality products, and complete within time frame and cost. These problems arose because of failures to effectively communicate among parties in the construction project due to the complexity of the construction project. In the era of digitalisation, the utilisation of new technology could help the construction industry overcome the issues of processing complex information. The usage of Augmented Reality (AR) is one of the approaches. AR technology has gained much attention in the construction industry on how it potentially helps solve common problems in construction. AR integrates digital information with a real-time user environment to resolve communication issues in complex projects. Besides that, AR can minimise 2D drawing by digitally visualising the end product of a construction project. However, despite all the benefits AR can offer, the implementation of AR in Malaysian construction is still lagging. Therefore, the aim of this study is to determine the factors hindering the application of AR in Malaysian construction industry. In this study, a questionnaire survey was conducted to obtain the possible hindering factors in implementing AR among Malaysian construction companies. Relative Importance Indices (RII) were utilised to analyse the data. In this study, the questionnaires were distributed via email

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Faculty of Civil Engineering Technology, UMP Research Series: Construction Engineering and Management, Vol. 1, [insert doi here later]

to 260 potential respondents and only 105 responded, which represents 40% of the response rate. From the analysis, it was revealed that the main factors that could hinder the AR implementation are: lack of knowledge about AR, lack of training on AR application, higher cost in investing AR technology and infrastructure, and absence of push from government and clients. In conclusion, to enable the progressive use of the technology, it is important to address the actual factors hindering the implementation of AR in Malaysian construction. At the same time, every party in the construction industry should play a role in promoting the use of AR in their construction project.

Keywords Augmented Reality (AR), Malaysian Construction Industry, Digitalisation, Construction, Barriers.

Introduction

Today, demand and need by the owners make the construction projects becoming more complex and unique. The complexity of construction projects can contribute to the loss of information due to improper systems to gather, store and distribute data among the construction project team. Ajam et al. (2010); Mohd et al. (2014) and Nguyen et al. (2016) found that using improper systems to streamline communication and coordination among parties in the construction projects will jeopardise the success of the projects, because they have to deal with complex communication process due to the increase of complex information. Yeh et al. (2012) added that processing the complex information due to the complexity of the construction project becomes tougher through the traditional mediums such as using 2D drawing as a communication tool between different parties in the construction project. Furthermore, using 2D drawing as coordination tools could result in drawing discrepancies because architects, civil and structural engineers, and mechanical and electrical engineers will produce their 2D drawings. As a result, the possibility of any team in the construction projects will be receiving outdated plans is inevitable, since it is updated and created separately (Dossick, 2010). This situation exposes the urgency to have a proper tool for

processing the complex information required in the construction project (Chi et al., 2013; Taylor & Bernstein, 2008).

In the era of digitalisation, the utilisation of new technology could help the construction industry overcome the issues of processing complex information. However, failing to cater to communication issues could lead to poor project performance warned (Gustavsson & Gohary, 2012), because failure in providing accurate information to the construction site results in construction cannot complete within the time frame and cost. These happened because the contractors have to spend their time asking for clarification, changing of plans and sometimes re-working components that were installed according to the contractor's interpretation of the documents but not in compliance with the owner's needs (Hamzah et al., 2011; Mohd et al., 2014). To cater to these issues, Eastman et al. (2011) and Ding et al. (2014) viewed Building Information Modelling (BIM) as a potential platform to increase the collaboration of information between different parties in the construction projects and can resolve some problems, especially in the coordination of information. The ability of BIM to provide a platform for collaboration between different parties in the construction project by exploiting the 3D parametric model. This 3D parametric model can be accessed during the construction phase by the contractors to obtain actual and updated construction information, and help construction workers to have a better understanding of the intended design (Wang et al., 2014; Chu et al., 2018). Furthermore, 3D modelling technology with integrated information technology speed ups drawing productions. The involvement of multi-disciplinary project coordination view from architecture, civil engineering, computer science and manufacturing was making use of the advanced revolutionising of the traditional construction (Wenjie et al., 2020). The involvement of BIM allows 3D models to be updated in real-time by project teams. The modelling helped improve visualisation and coordination, as well as detect design difficulties and design faults (Kong et al., 2020).

Many research findings show the importance of BIM in promoting information integration between parties in the construction project. However, recent development in AR, especially its potential to visualise BIM models during the construction phase, gets more attention from the construction workers (Chi, et al., 2013; Volk et al., 2014). AR can be treated as advanced evolution of BIM. AR usage during the construction phase could lead the construction industry towards efficiency through increased collaboration between different project participants. AR could increase the efficiency of project performance. However, when reflected on the application of AR in the Malaysian construction industry, there is not much effort to study the application of AR contrary to the application of BIM. Therefore, this study aims to study the factors that hampered the implementation of BIM through AR at construction sites.

Literature Review

Augmented Reality (AR)

AR can be defined as *"Augmented reality (AR) creates an environment where computer-generated information is superimposed onto the user's view of a real-world scene"* (Chi et al., 2013). In general, Gelder et al. (2013) said that AR enhances the actual environment by allowing richer and more compelling experiences to interact with human senses through digital information to the real world. AR technology has been implemented in many different fields and the applications are broad. For example, AR was used to enhance the GPS, making it easier to move from one place to another in the navigation system. AR can also be used in the medical field; the real-time visualisation of AR aids the medical student in practising surgery in a controlled environment (Yiannakopoulou et al., 2015). This virtual experience is obtained via Head-Mounted Display (HMD) such as virtual google, or Handheld Device (HHD) such as smartphones and tablets.

In Malaysia, one of the early adopters of AR in their advertising campaign was Malaysia Airlines, back in 2010, where people were able to scan the sky towards the direction of the nearest airport and obtain flight deals (Wafa & Hashim, 2016). A study in the tourism field that gained support from the Ministry of Tourism Malaysia has been carried out by analysing the existing design guidelines of Mobile Augmented Reality (MAR) (Wafa & Hashim, 2016). The application of AR is relatively new in the construction industry, especially in Malaysia. However, for a developed country, the application of AR started early in 2017. For instance, United Kingdom (UK) and United States (US) believe AR is considered an essential technology to improve construction projects (National Infrastructure Commission, 2017; GSA, 2017). Traditionally, during the construction phase, lots of information are gathered and distributed using many drawings and papers. Using AR and BIM where construction workers can access the drawing via model by using HHD can eliminate the paper-based communication approach; thus, minimising the error during construction (Ajam et al., 2010; Chu et al., 2018). On the other hand, there are lots of benefits by applying AR and BIM during the construction phase, such as giving an accurate visualisation of what to construct, being able to verify whether new equipment will fit and for clash detection, giving on-site support for decision making, and also can support in finding hidden assets (Neges and Koch, 2016; Dong et al., 2013; Schubert et al., 2015; Seo and Lee, 2013).

Besides lots of benefits gained from the application of AR to improve the construction projects, the adoption rate is still slow and about 34.5% of construction companies in the UK have used AR in their project (Woyke, 2016; Davila Delgado et al., 2019). Although the introduction of AR in Malaysia started in 2010, to date, there is no data revealed the actual percentage of construction companies that have used AR or heard about AR. Thus, there is the need to study the status of AR applications and the hindering factors in the implementation of BIM through AR among Malaysian construction players.

Factors Hindering Implementation of AR in Malaysian Construction

Despite the growing interest in AR in the construction industry, challenges and issues still exist in adopting this technology in Malaysian construction. These things need to be addressed to enable the progressive use of AR in the industry. There were a huge transformation and expansion within the global construction development based on people, financial, technology, internal and external pressure. The concept of application in AR frameworks the matching concept; thus, interacting in a non-existing adjoining (digital fact) also creates usage of a remaining environment as well as implementing virtual elements.

As a potential revolution, AR stood as an interactive, reality-based display environment that proceeds the abilities of the computer-generated display, sound, textual content and special effects to enhance the user's real-life experience. AR combines real and computer-based scenes and images to convey a united but enhanced view of the world.

In addition, the relationship of peoples, financial and technology, and internal and external pressure could help the construction administrator more clearly understand the nature of construction towards continuously improving the construction system. Moreover, applying AR in the lifecycle construction can help process the project within a reasonable budget, and to avoid faults or additional time. Based on these arguments and study by the previous researchers, therefore, this study focuses on the factors that hinder the adoption of AR from the perspective of people, financial, technology, and internal and external pressure. Figure 1 shows the theoretical hindering factors in implementing AR based on the collection of factors by the previous studies and will be discussed lengthily in the next section (Davis & Songer, 2008; Hartman & Fischer, 2008; Wu & Issa, 2014; Lu & Li, 2011; Lee et al., 2013; Wang et al., 2014; Osman et al., 2015; Eadie et al., 2013; Smith, 2014)

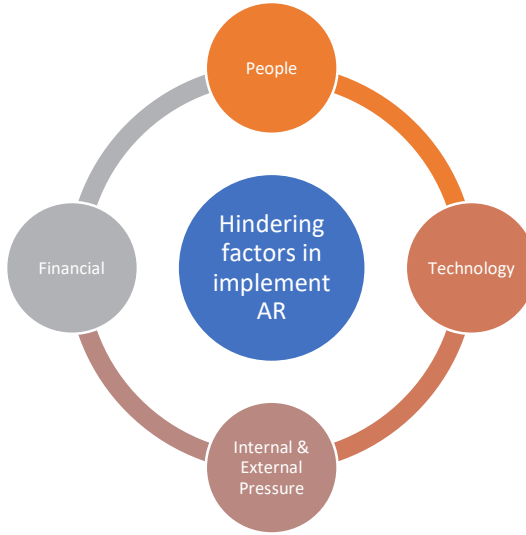

Figure 1: The theoretical hindering factors in implementing AR

People

Studies from Davis and Songer (2008), Hartman and Fischer (2008), and Wu and Issa (2014) showed that resistance from people is the most critical hindering factor in implementing new technology. There are many factors why people are resistant to adopting new technology, such as lack of knowledge, afraid to change current practice due to not knowing new practice, no support or urgency from top management and unaware of the existing technology (Majid et al., 2011; Suebsin & Gerdsri, 2009; Song et al., 2017). Besides that, the unavailability of experienced people to operate the specific technology is also the reason of low adoption of new technology in the construction industry (Song et al., 2017). Furthermore, low support from top management, especially to undergo training for a specific technology, increases the resistance from people to adopt new technology (Majid et al., 2011). Therefore, the factors from people that hinder AR adoption are as follows; lack of knowledge, no support from top management, lack of training fund allocated by top management, unaware of the AR technology, and unavailability of experienced individuals on the specific technology, i.e. AR.

Financial

Financial is the most common hindering factor related to adopting new technology, because the initial investment of new technology always requires a lot of budgets (Lee et al., 2013). This includes the cost of training, purchasing new technology, upgrade current infrastructure to support new technology and recruiting experienced personnel (Lu & Li, 2011; Lee et al., 2013; Wang et al., 2014). Besides that, there is no real data for return of investment from the utilisation of AR. Therefore, many organisations hesitate to invest in this technology (Wang et al., 2014). Furthermore, according to Eastmant et al. (2011), most early adopters are concerned about the return of investment (ROI) when they invest in new technology. There is no tangible figure indicating that implementing AR, for instance, can reduce the overall construction cost. From these statements, the factors from a financial point of view that hinders the adoption of AR are as follows; higher initial cost in investing in AR technology in term of acquiring AR technology and upgrading infrastructure to support AR technology, no solid evidence showing that by using AR can reduce or control the construction cost, higher cost of training, and higher cost to recruit experienced personnel.

Technology

AR application in the Malaysian construction industry is still in the infant stage. There are many factors that contributed to the technology issues that hinder the adoption. When migrating to new technology, the issue of complexity is the most prominent issue that causes people or organisations feel reluctant to adopt new technology. This is due to the fact that they felt learning a complex technology could drag back their process and, at the same time, it will impact their productivity (Osman et al., 2015). They believed that less complexity of the technology would make it easy for adaptation. Since the AR technology seems new, the maturity of the technology is questionable because it will disturb their productivity if there are hiccups during the usage of AR, for instance, especially on-site application (Eastman et al., 2011), including the issue of compatibility. Son et al. (2015) and Kim et

al. (2017) revealed that software operation issue such as compatibility was identified as one of the prominent obstacles to adopt new technology. The issue of compatibility is very crucial because it is involved in data or information exchange. If the dedicated AR tools on-site, for instance, are not compatible with the system produced by the consultant team, it will affect the accuracy of information gathered by construction workers on-site and give inconsistent information or data (Smith & Tardif, 2009). Lastly, there is no guideline or standard available for them to follow. Having a standard or guideline will help them properly implement new technology and reduce error (Anh et al., 2015; Howard et al., 2017). Technology factors that could hinder the implementation of AR are as follows; the complexity of the technology, the issue of maturity or availability of the technology, the compatibility of the technology, and standard or guideline not available.

Internal and External Pressure

There is a need for internal or external pressure for implementing new technology, whether from the government or client, or top management. However, there is no solid evidence that there is urgency from external, i.e. clients or local authorities, to use AR tools on construction sites. Without these factors, any organisation has any excuse not to apply any new technology in their project. A study was done by Eadie et al. (2013) and Smith (2014), in implementing Building Information Modelling (BIM), they found that the adoption rate is very high in United States (US), United Kingdom (UK) and Singapore is because there is a push from the government to implement BIM in any government projects and this indicate that insistence from the authorities is one of the primary factors influencing BIM adoption. US mandating the use of BIM via General Services Administration (GSA), Singapore driven by the Building and Construction Authority (BSA), which is the main organisation involved in the development and implementation of BIM for government projects, and for the UK is through Cabinet Office (Khemlani, 2005; Succar, 2010; Eadie et al., 2013; Smith, 2014). For the implementation of AR in construction projects, in the UK, in 2017, their government

promoted AR through Data for Public Good Report by considering AR as the key new technology to increase productivity on infrastructure delivery, maintenance and support decision-making (National Infrastructure Commission, 2017). Meanwhile, in the US, also in 2017, their government launched the Federal Virtual or Augmented Reality program to coordinate the collaboration for the research and refinement of AR and VR business cases and pilot programs (GSA, 2017). Thus, without having internal and external pressure, no support from the government or top management is one of the key factors hindering the adoption of AR in construction projects.

Methodology

In order to achieve the goal of this study, an exploratory survey was used to discover and identify the relative importance of the hindering factors in implementing AR in Malaysian construction industry. The survey questionnaire consists of two sections. The first section was to identify the respondents' profiles. The second section of the questionnaire was designed to identify the hindering factors in implementing AR. A total of 17 variables were used to identify the hindering factors and they are clustered into four themes, as shown in Table 1. A five-point Likert scale ranging from 1 that represented the least important, to 5, which represented the most important, was used to capture the importance of the hindering factors in implementing AR in Malaysian construction industry.

Data Collection

Data from Construction Industry Development Board (CIDB) revealed that about 732 construction companies with grade G7 were registered. In this study, a convenience sampling method was used. However, this approach has the potential for bias, but, according to Frey et al. (1991), research conducted using exploratory study and preliminary study convenience sampling was considered appropriate. Using the method suggested by Krejcie and Morgan (1970), the number of samples for 732

population is about 260. Therefore, the questionnaires were distributed via email to the 260 potential respondents.

From 260 questionnaires distributed, 105 responded, which represents 40% of the response rate. According to Frohlich (2002), the average response rate for the organisational survey is about 30 to 40 %. Considering this, as a preliminary study, the response rate of 40% is considered sufficient and appropriate for further analysis.

Table 1: Variables to measure the hindering factors in implementing AR

Theme	Factors
PEOPLE	P1. Lack of knowledge about AR
	P2. Lack of training on AR application
	P3. Lack of support from top management to use AR application
	P4. Unaware of the availability of AR technology in the market
	P5. Lack of experienced workers in operating AR
FINANCIAL	F1. Higher initial cost in investing AR technology
	F2. Lack of funds to promote training on AR
	F3. Higher initial cost in upgrading infrastructure to support AR technology
	F4. Higher cost in recruiting an experienced worker
TECHNOLOGY	T1. The issue of complexity in operating AR technology
	T2. Maturity issue of AR technology
	T3. Compatibility of AR technology
	T4. Absence of guideline or standard on AR application

Theme	Factors
INTERNAL & EXTERNAL PRESSURE	E1. Absence of pressure from the government to use AR
	E2. Absence of pressure from clients to use AR
	E3. Absence of incentive provided by the government if use AR
	E4. Benefits are not tangible enough to warrant its use

Method of Data Analysis

In this study, Relative Importance Indices (RII) were used to identify the hindering factors in implementing AR. First, RII was calculated using Equation (1).

$$\text{RII} = \frac{\sum PiUi}{N(n)} \quad (1)$$

Where;
RII = Relative Importance Indices
Pi = Respondent's rating
Ui = Number of respondents placing an identical weighting/rating
N = Number of samples
n = The highest attainable score (in this study, n is 5)

The value for RII ranges from 0 to 1, and the factors that scored the highest value of RII are the most important factors.

Result and Discussion

Table 2. Cronbach's Alpha value for pilot testing and actual data collection

Theme	Factors	Cronbach's alpha value (Pilot)	Cronbach's alpha value (Actual)
PEOPLE	P1. Lack of knowledge about AR	0.871	0.837
	P2. Lack of training on AR application	0.754	0.843
	P3. Lack of support from top management to use AR application	0.781	0.758
	P4. Unaware of the availability of AR technology in the market	0.751	0.766
	P5. Lack of experienced workers in operating AR	0.785	0.815
FINANCIAL	F1. Higher initial cost in investing AR technology	0.714	0.791
	F2. Lack of funds to promote training on AR	0.706	0.736
	F3. Higher initial cost in upgrading infrastructure to support AR technology	0.751	0.795
	F4. Higher cost in recruiting an experienced worker	0.738	0.724

Theme	Factors	Cronbach's alpha value (Pilot)	Cronbach's alpha value (Actual)
TECHNOLOGY	T1. The issue of complexity in operating AR technology	0.753	0.749
	T2. Maturity issue of AR technology	0.706	0.708
	T3. Compatibility of AR technology	0.723	0.769
	T4. Absence of guideline or standard on AR application	0.730	0.815
INTERNAL & EXTERNAL PRESSURE	E1. Absence of pressure from the government to use AR	0.734	0.795
	E2. Absence of pressure from clients to use AR	0.767	0.775
	E3. Absence of incentive provided by the government if use AR	0.778	0.731
	E4. Benefits are not tangible enough to warrant its use	0.719	0.785

Before conducting the data collection via survey questionnaires, pilot testing was conducted to examine the reliability of the research instrument, which is survey questionnaires. According to Ticehurst and Veal (2000), reliability refers to *"the extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects."* In other words, the reliability indicates that the instrument offers consistent measurement across time and the various items in the instrument (Kripanont, 2007). To test the reliability of research instruments, Cronbach's Alpha is used. Hair et al. (2006) suggested that any construct that scores more than 0.70 is acceptable, while Malhorta (2004) suggested that a value that is more than 0.60 is acceptable. In this study, 30 respondents participated in the pilot testing, which is in the range of 12 -100 respondents for pilot testing (Cooper & Schindler, 2006). Convenience sampling methods were used to select the respondents and delivered via an online electronic survey. Table 2 shows the score of Cronbach's Alpha for each variable during pilot testing and actual data collection, and found that the reliability of this research instrument is acceptable and fit for further analysis.

Analysis of Factors Hindering Implementation of Augmented Reality (AR) in Malaysian Construction

Factor of People

Table 3 shows the overall result of factors that hinder the implementation of AR from people's perspectives.

Table 3: RII result for people factors

Theme	Factors	RII Score	Rank
PEOPLE	P1. Lack of knowledge about AR	0.981	1
	P2. Lack of training on AR application	0.871	2

Theme	Factors	RII Score	Rank
	P3. Lack of support from top management to use AR application	0.653	4
	P4. Unaware of the availability of AR technology in the market	0.621	5
	P5. Lack of experienced workers in operating AR	0.735	3

Table 3 reveals that lack of knowledge about AR is the most prominent factor for the people theme in implementing AR, followed by lack of training on AR application. The majority of respondents believed that lack of knowledge about AR contributes to the resistance in implementing AR because they did not know what to achieve and what AR can contribute to their daily activities. Besides that, the majority of them still questions what AR can offer to increase the performance of their project. This is aligned with findings from Dewan et al. (2004) that any organisation that introduces a new approach or new work process would face resistance from their staff at the early stage. This resistance came because they did not know what new technology could offer. Factor lack of training on AR application also contributes to the resistance in implementing AR, because they believed they need training to reduce their unknown, as without proper training, they are still in the dark about AR. This is supported by Lee & Yu (2016) and Song et al. (2017), which reported that many organisations did not achieve a satisfactory implementation of new technology because of lack of training. Therefore, the least factor that could hinder the implementation of AR is unaware of the availability of AR technology in the market.

Factor of Financial

Analysis of RII, as shown in Table 4, reveals that higher initial cost in investing AR technology and higher initial cost in upgrading infrastructure to support AR technology are the factors that hinder the implementation of AR, which share the same RII

score, which is 0.901. The majority of respondents believed that to change from the current process into a new process involves cost when applying new technology. The higher cost is their main concern to adopt new technology. The cost may include purchasing the tools and software, and renewing the license. This dilemma is aligned with Rodgers et al. (2015), where the top management will decide to adopt or not based on the costing. The least factor for financial that could hinder the implementation of AR is having a higher cost in recruiting an experienced worker.

Table 4: RII result for financial factors

Theme	Factors	RII Score	Rank
FINANCIAL	F1. Higher initial cost in investing AR technology	0.901	1
	F2. Lack of funds to promote training on AR	0.851	2
	F3. Higher initial cost in upgrading infrastructure to support AR technology	0.901	1
	F4. Higher cost in recruiting an experienced worker	0.515	3

Factor of Technology

The result from RII analysis, as shown in Table 5, reveals that the issue of complexity in operating AR technology is the main factor that could hinder the pace of implementing AR, followed by there is no guideline or standard on AR application. The majority of respondents believed that less complex AR applications would ease adoption, because the time for learning can be shortened. A study was done by Kunz and Fischer (2009) and Giligan and Kunz (2007), they found that the complexity of new technology will increase the cost and time for training, and any organisation tries not to adopt any new technology with higher complexity. Having higher complexity of the technology will increase the resistance to adopt AR. Respondents also believed that if there is a standard or guideline on AR application available, it could speed up the

pace of adoption because of their new working process. However, the unavailability of guidelines or standards on AR application caused most respondents to hesitate to implement AR to avoid adopting new working procedures. They have to know the right procedure to avoid any mistake that could cost them. The least factor that could hinder the application of AR is the maturity issue of AR technology.

Table 5: RII result for technology factors

Theme	Factors	RII Score	Rank
TECHNOLOGY	T1. The issue of complexity in operating AR technology	0.854	1
	T2. Maturity issue of AR technology	0.623	4
	T3. Compatibility of AR technology	0.794	3
	T4. Absence of Guideline or Standard on AR application	0.824	2

Factor of Pressure from Internal and External

Table 6 shows that most respondents agreed that lack of push from government and clients is the main factor that hinders the process of implementing AR. They believed that government and clients should play a significant role in promoting the application of AR. Mandating AR is one of the pushes that government or clients can apply to speed up the pace in adopting AR. UK and US, even Singapore, are using this approach when promoting BIM in their construction project. In general, the private and public sectors have to play their role in promoting AR application in construction projects. From Table 6, the least factor that hinders the adoption of AR application is the lack of incentive given by the government for companies that use AR in their project.

Table 6: RII result for internal and external pressure factors

Theme	Factors	RII Score	Rank
INTERNAL & EXTERNAL PRESSURE	E1. Absence of pressure from the government to use AR	0.911	1
	E2. Absence of pressure from clients to use AR	0.911	1
	E3. Absence of incentive provided by the government if use AR	0.542	3
	E4. Benefits are not tangible enough to warrant its use	0.845	2

Conclusion

AR is a phenomenon that currently influences the construction industry's lifecycle. The representation of AR is introduced as a guidance to reflect construction ideas on different media. It is the component that might potentially be the most affected by the developments in the latest technologies. With the support of AR, courses for representation methods in construction may become something more than only apply how to use digital technologies and computers as information tools, and they may become real information instruments. Therefore, implementing AR is not as simple as upgrading a new system, and this study successfully reveals the main hindering factors in the adoption of AR. The main hindering factors from the perspective of people, financial, technology, and external and internal factors are lack of knowledge about AR, lack of training on AR application, higher initial cost in investing AR, higher initial cost in upgrading infrastructure to support AR technology, issue of complexity in operating AR technology, absence of guideline or standard on AR application, absence of pressure from the government to use AR and absence of pressure from clients to use AR. In order to ease the process of adoption of AR, it is suggested that an organisation should equip their workers with knowledge of AR, prepare training and education modules of AR, and develop guidelines and

standards to execute AR application working process. Furthermore, government and clients should play a major role to pressure Malaysian construction industry in adopting new technology in their construction project, such as considering the option of making AR mandatory for construction projects, awareness to the industry the importance of AR in a construction project, promoting AR through the showcase, sharing the success stories, and conducting seminars and workshops to promote AR. In conclusion, AR forms larger data sets; thus, optimisation scenarios as well as innovative appearance can be employed. Ultimately, the presence of participation from the government and clients; therefore, AR will enable benefits applications within the implementation of new technology in the industry. As the construction industry is knowledge-intensive, it involves a massive amount of data. AR, with the immersion of enormous data processing, will be led to the development of knowledge creation.

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