UNIVERSITI TEKNOLOGI MARA | College of Built Environment

Poster Book

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Editors:
Dr Aidatul Fadzlin Bakri, Nurzafira Zainul Abidin, Sr Dr Noor Akmal Adillah Ismail, Dr Har Einur Azrin Baharuddin, Assoc. Prof. Ts Gs Dr Abdul Rauf Abdul Rasam

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INTERNET OF THINGS (IOT) APPLICATION IN THE MALAYSIAN CONSTRUCTION INDUSTRY: THE TYPES AND CHALLENGES DURING THE CONSTRUCTION STAGE

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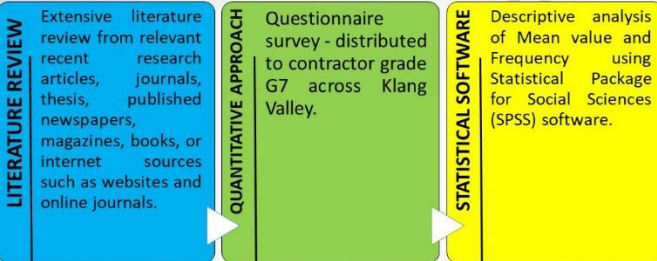UNIVERSITI TEKNOLOGI MARA — College of Built Environment (CBE)

INTRODUCTION

Construction Industry Development Board (CIDB) has already introduced the Construction 4.0 Strategic Plan for the year 2021 until 2025, focusing on the industrial revolution 4.0 to meet the standard of future development that is predicted to be more technological. Based on the Construction 4.0 Strategic Plan (2021-2025), there will be an addition of the Internet of Things (IoT) tools that will be introduced to the Malaysian construction industry, such as Augmented Reality (AR), Big Data, etc. Moreover, this is in line with the importance of the Sustainable Development Goals (SDG) to obtain technological solutions based on IoT. These IoT tools would encourage modern digitalization, which could indirectly boost the industry's productivity. Even with these advantages, the implementation of IoT in the construction industry is still low, and many challenges are faced by the construction players during the implementation of IoT (Gamil et al., 2019), especially in the construction stage. However, this stage is the most crucial in the construction process. Any issues arising during the construction stage would result in time and cost overrun, leading to project failure and abandonment. To realize the government's aspirations in moving towards better technological advancement, it is an urgent need and a wholesome effort by contractors to understand the type of IoT used and the challenges in adopting IoT during the construction stage. Thus, this research will contribute to the enhancement of IoT usage and encourage modern digitalization, which indirectly boosts the performance of the contractor's practices in the Malaysian construction industry.

OBJECTIVES

1. 1)To identify the type of Internet of Things (IoT) used during the construction stage.

2. 1)To determine the challenges in adopting the Internet of Things (IoT) during the construction stage.

METHODOLOGY

LITERATURE REVIEW: Extensive literature review from relevant recent research articles, journals, thesis, published newspapers, magazines, books, or internet sources such as websites and online journals.

QUANTITATIVE APPROACH: Questionnaire survey - distributed to contractor grade G7 across Klang Valley.

STATISTICAL SOFTWARE: Descriptive analysis of Mean value and Frequency using Statistical Package for Social Sciences (SPSS) software.

NOVELTY

Theoretical contributions to body of knowledge:
➤ Identification of the type of Internet of Things (IoT) used and the challenges during the construction stage.

Practical contributions to construction industry:
➤ Provides more depth to the assessment of IoT that facilitates the future direction of successful IoT implementation in Malaysia
➤ To be used by contractors and industry professionals (government or private sectors) as a benchmark to improve the application of IoT
➤ Offer new knowledge and skills for appropriate education and training purposes.

CONCLUSION

Based on the data that have been analysed, several IoT tools can help to solve the issues. However, there are also many challenges in adopting IoT during the construction stage that has been discovered. Therefore, the research outputs seek to understand better IoT usage and the challenges during the construction stage. In future studies, the researcher can enlarge the scope by focusing on and emphasizing different locations, comparing the reasons behind the differences, and comparing the challenges of implementing the IoT between the older and younger generation in the construction industry.

ISSUES/ PROBLEM STATEMENT

❖ **Lack of skills and knowledge**
▪ Lack of skills and knowledge results in insufficient training for the construction practitioner to learn IoT. Hence, there is a need for IoT expertise in this industry (Jesse, 2018).
▪ With a lack of IoT expertise, the cost to provide training classes will also be high since there is a lack of training centres.

❖ **Lack of security and safety**
▪ With IoT, all information regarding the construction projects will be compiled into an online database such as cloud storage. Therefore, online data is fragile to external threats such as malware and ransomware attacks. According to Humayun (2021), these attacks may lead to several consequences, such as data destruction, loss of data and loss of productivity since much time is needed to retrieve the lost data, which may also result in money losses. Furthermore, loss of confidential data will lead to loss of reputation for the companies.
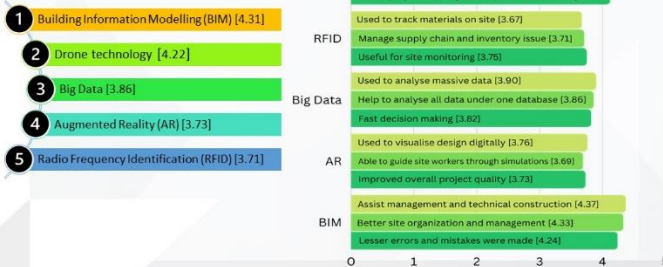
❖ **Lack of robustness in connectivity**
▪ Lack of robustness in connectivity can be referred as the system's inefficiency in performing when any failure occurs throughout its usage (Gamil et al., 2020). This can affect the interoperability of the device (GSM Association, 2014), thus leading to a problem in transferring and receiving the data since the information might change within seconds.
▪ Based to Vidal et al., (2021), mistakes like this without any mitigation plan to solve this issue can also result in delays and increased costs.
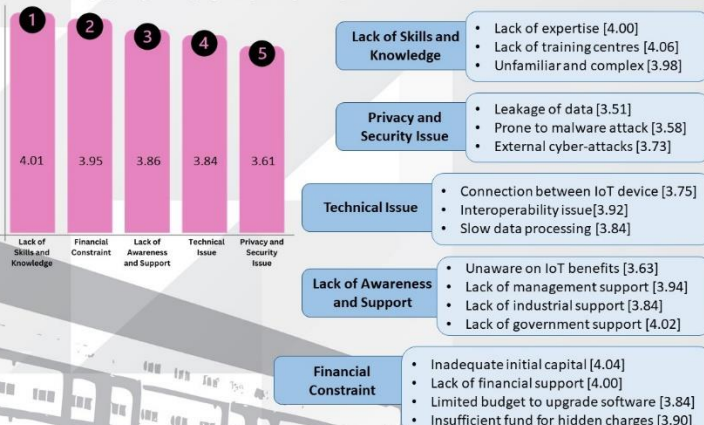
FINDINGS

TYPE OF IoT USED DURING THE CONSTRUCTION STAGE

RANKING
1. Building Information Modelling (BIM) [4.31]
2. Drone technology [4.22]
3. Big Data [3.86]
4. Augmented Reality (AR) [3.73]
5. Radio Frequency Identification (RFID) [3.71]

Drone
- Used to visualise work progress [4.27]
- Provide real-time footage of site [4.25]
- Better project delivery and improve productivity [4.12]

RFID
- Used to track materials on site [3.67]
- Manage supply chain and inventory issue [3.71]
- Useful for site monitoring [3.75]

Big Data
- Used to analyse massive data [3.90]
- Help to analyse all data under one database [3.86]
- Fast decision making [3.82]

AR
- Used to visualise design digitally [3.76]
- Able to guide site workers through simulations [3.69]
- Improved overall project quality [3.73]

BIM
- Assist management and technical construction [4.37]
- Better site organization and management [4.33]
- Lesser errors and mistakes were made [4.24]

CHALLENGES IN THE ADOPTION OF IoT DURING THE CONSTRUCTION STAGE

1. Lack of Skills and Knowledge — 4.01
2. Financial Constraint — 3.95
3. Lack of Awareness and Support — 3.86
4. Technical Issue — 3.84
5. Privacy and Security Issue — 3.61

Lack of Skills and Knowledge
- Lack of expertise [4.00]
- Lack of training centres [4.06]
- Unfamiliar and complex [3.98]

Privacy and Security Issue
- Leakage of data [3.51]
- Prone to malware attack [3.58]
- External cyber-attacks [3.73]

Technical Issue
- Connection between IoT device [3.75]
- Interoperability issue [3.92]
- Slow data processing [3.84]

Lack of Awareness and Support
- Unaware on IoT benefits [3.63]
- Lack of management support [3.94]
- Lack of industrial support [3.84]
- Lack of government support [4.02]

Financial Constraint
- Inadequate initial capital [4.04]
- Lack of financial support [4.00]
- Limited budget to upgrade software [3.84]
- Insufficient fund for hidden charges [3.90]

PREPARED BY:
Nur Airin Amira binti Zuhairinizam
Sr Dr. Ani Saifuza binti Abd Shukor
Centre of Studies for Quantity Surveying, College of Built Environment, University Teknologi MARA, 40450, Shah Alam, Selangor, Malaysia.