Research Article

i-PWD Mobile Application as a Method of Digital Learning for Construction Contract Management

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Abstract: *The use of mobile applications (apps) has become increasingly prevalent in various sectors, including education and construction. In the current scenario of education and construction sector, where continuous learning and dissemination of knowledge are crucial, mobile apps have emerged as valuable tools for teaching and learning construction related subjects. With the widespread use of mobile apps in the education and construction industry, students and construction stakeholders can access documents and other information quickly and without wasting time. Therefore, mobile apps are becoming a significant as they not only increase efficiency but also save time. This study examines the use and importance of mobile apps in regard to the i-PWD (Integrated Public Work Department) app to provide effective learning experiences for construction contract management in Malaysia. The i-PWD app was developed to cater the needs of students and construction practitioners and provide them with a platform to acquire knowledge on construction contract management in a convenient and accessible manner. The app offers a number of features that enhance the learning process, such as interactive e-learning, multimedia content for various information related to the construction contract and procurement, quizzes, and real-world of construction issues. These features allow users to actively engage with the material, which promotes deeper understanding and retention of construction concepts. This apps were developed using APK software and can be used via mobile phones or tablets with Android systems. In addition, a quantitative data analysis using a questionnaire survey was conducted to assess the perception of the i-PWD mobile apps among 100 selected respondents, including diploma and bachelor's degree program in Quantity Surveying at UiTM Sarawak and UiTM Shah Alam. The overall results show that this apps can enhance knowledge on construction-related topics and can be effectively integrated into education and the construction industry.*

Keywords: Mobile Apps, Construction Education, Construction Industry, Interactive, Teaching & Learning

1. INTRODUCTION

Effective contract management plays a crucial role in the success of construction projects (Gamage, 2023). It involves the proper administration and execution of contracts, ensuring compliance with legal requirements, managing risk and facilitating efficient project delivery (Gransberg & Shane, 2010). Therefore, a comprehensive understanding of construction contracts and their management is

essential for construction professionals. In the Malaysian construction industry, the Public Work Department's (PWD) standard form of contract is commonly used to administer contracts that are legally binding between two parties, which is the employer and the contractor, and specify a set of terms and conditions for the construction project (Zakaria et al., 2022). Generally, standard form of contract provides a detailed legal framework that sets out the rights, obligations, and duties of the parties and establishes the scope of powers and duties of the contract administration procedures (Bailey, 2014). The PWD standard form of contract is also taught at some of the university in Malaysia and learnt by students, especially in quantity surveying field, to administer the construction contract. Currently, the PWD contract only exists in printed documents which consist of 54 pages long. It is a necessary document to be read and understood by construction stakeholders and academics and students involved in construction (P.W.D., 2010). Unlike electronic information, printed papers need to be manually searched, take up a lot of space, are prone to damage, have editing problems, more expensive to obtain and have a poor environmental impact.

Therefore, the integration of construction contract management and mobile apps is a promising avenue for learning and skills development in construction. Mobile apps provide a dynamic and interactive learning environment that enables individuals to acquire and enhance their knowledge of construction contract principles and practises (Liaw et al., 2010). The following sections of this paper take a closer look at the specific functions of the i-PWD apps for learning construction contracts and examine their effectiveness through quantitative data analysis, benefits, and potential impact on the construction industry.

2. I-PWD MOBILE APPS FEATURES & BENEFITS

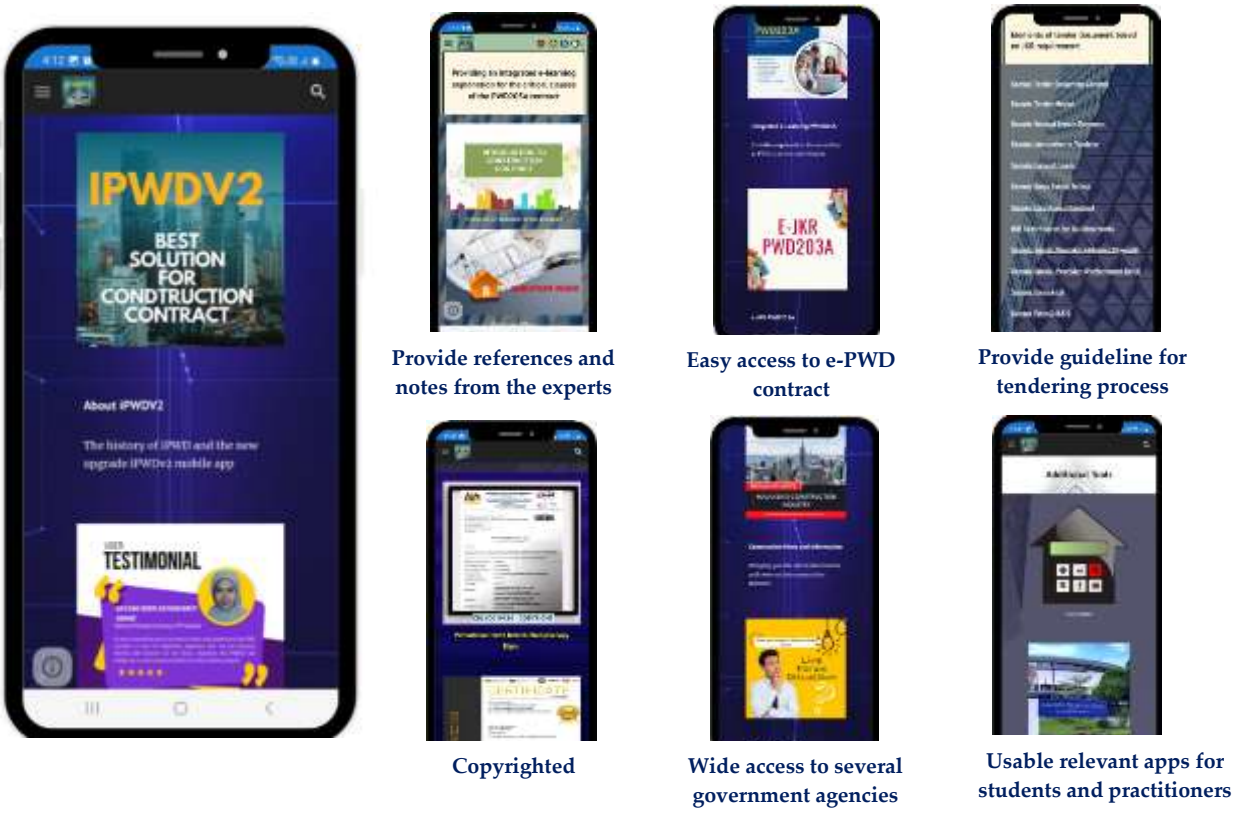

Figure 1. i-PWD Mobile Apps Features

The i-PWD (integrated public work department) is a mobile app that provides easy access to a wealth of information on construction contracts and is the perfect tool for managing construction contracts in Malaysia construction industry. One of the key benefits of i-PWD mobile apps is their flexibility and portability. Users can access the app anytime, anywhere, allowing them to learn at their own pace and convenience. Civil engineering and construction students can supplement their classroom learning with the app's resources to deepen their understanding of theoretical concepts and gain practical insights. For construction practitioners, the i-PWD app serves as a valuable resource for continuous professional development, providing them with up-to-date information, industry best practises and opportunities for skill enhancement. In addition, the i-PWD app fosters a collaborative learning environment by allowing users to connect and interact with peers, educators and industry experts. Discussion forums, chat functions and networking features facilitate knowledge sharing, problem solving, and the establishment of professional networking within the construction industry. This collaborative aspect of the app fosters a sense of community and allows users to benefit from different perspectives and experiences. The novelty of this apps was built with the APK software and compatible to all mobile hand phone or tablet with android system. The apps is user-friendly and beneficial for construction and Quantity Surveying students.

2. METHODOLOGY

This study uses a quantitative approach using a questionnaire survey. A questionnaire was developed to capture the feedback and perceptions of the respondents on the various statements related to the use and importance of the i-PWD apps for learning construction contracts. The questionnaire contained a series of statements or feedback, and respondents were asked to indicate how much they agree or disagree on a five (5) point Likert scale. A sample of one hundred (100) respondents was selected for the survey, consisting of diploma and bachelor's degree programs in Quantity Surveying at UiTM Sarawak and UiTM Shah Alam. In this study, a purposive sample was drawn by identifying the students who are currently attending or have attended the Construction Contract Management Course (DQS359) and (BQS559). The students tested and demonstrated the developed i-PWD mobile apps before answering the survey. The questionnaire was distributed to the selected respondents through the online platform Google Form. Respondents were instructed to read each statement or feedback carefully and indicate their level of agreement or disagreement by selecting the appropriate Likert scale response. The data obtained was presented in the form of tables for ease of understanding. The analysis involved calculating the frequency of responses for each category (strongly disagree, disagree, neutral, agree, strongly agree) for each statement and calculating the average index for the overall level of agreement or disagreement for each statement. In addition, the statements were ranked based on their average index scores to identify the statements with the highest and lowest agreement.

3. FINDINGS AND DISCUSSION

The survey consists of the background of the respondent, the apps outcome and its functionality. Here, the word respondent is used interchangeably with student. All respondents were found to be between 20 – 30 years old when they responded to this survey. It is also indicates that 40% (40) of the respondents are male while 60% (60) are female. Table 1 shows the respondents' understanding and perception of the i-PWD mobile apps based on their experience in demonstrating the apps.

The majority of respondents strongly agree that the app is easy to use and provide a convenient and attractive way to learn about public work department practices. The average index for this statement is the highest at 4.05 and 4.03 respectively. These both statement is also ranked first, indicating that the app's user interface, functionality, convenience and attractiveness in learning about public work department practices are highly appreciated . Regarding the statement that the information in the app is helpful for the procurement process and procedure in Public Work Department, the majority of respondents (33) agree that the app provides helpful information. There are also a significant number of neutral (17) and strongly agree (44) responses. The average index for this statement is 3.84, indicating a generally positive perception of the usefulness of the app in understanding Public Work Department procurement processes. This statement ranks 9th on the average index, suggesting that while the app is helpful, there is still room for improvement in providing clearer information.

A significant number of respondents agree (41) that the app's functions and content reflect current practise and information on government contracts. The average index for this statement is 3.90, indicating a positive perception of the app's alignment with current practises in the industry. This statement ranks 4th in terms of the average index, indicating that the app is perceived to be in line with industry requirements. In relation to the inclusion of relevant law cases regarding the construction industry, the majority of respondents agree (40) that the app includes relevant law cases, but there are also a notable number of neutral (13) and strongly agree (37) responses. The average index for this statement is 3.83, indicating a positive but somewhat lower perception compared to other statements.

Furthermore, the majority of respondents (33) agree that the app provides easily accessible and current historical construction data. The average index for this statement is 3.90, indicating a positive perception of the app's ability to provide relevant historical data. This indicates that the app effectively provides historical construction data and allows users to access valuable insights and trends from past projects. In relation to the current Public Work Department procurement and tendering process being clearly highlighted in the apps, a significant number of respondents (38) agree that the app clearly highlights the current Public Work Department procurement and tendering process. The average index for this statement is 3.93 and ranks 3rd, indicating a positive perception of the app's effectiveness in explaining the procurement process. This shows that the app successfully presents the intricate details of the Public Work Department procurement and tendering process and enables users to navigate the process more efficiently. Moreover, respondents generally agree (44) that the app has potential for further application in the construction industry. The average index for this statement is 3.87, indicating a positive perception of the app's potential in the industry.

Last but not least, the majority of respondents agree (41) that the app assists them in gathering information for assignments and helps students in understanding government contracts. The average index for these two statements is 3.90 and ranks 4th, indicating a positive perception of the app's usefulness in academic tasks. This also implies that the app is a valuable resource for students, making it easier for them to find information and assisting them with their task.

Overall, the findings indicate that the app is well received by users, particularly in terms of ease of use, convenient and attractive learning, alignment with industry practises and assistance in academic tasks. Although there are some areas for improvement, such as providing clearer information and expanding the number of relevant legal cases, the app shows great potential in supporting student learning and understanding of construction contract management.

Table 1: Respondents' Understanding and Perception on I-PWD Mobile Apps Usage

STATEMENTS/ PERCEPTION	SD	D	N	A	SA	$\Sigma 1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5$	$\Sigma X_1 + X_2 + X_3 + X_4 + X_5$	AI	R
	X_1	X_2	X_3	X_4	X_5				
The app is easy to use for students	3	7	13	20	57	405	100	4.05	1
Information in the apps helps on PWD procurement process and procedure	3	3	17	33	44	384	100	3.84	9
The functions and contents have reflected the current practice/information on government contracts	3	3	13	41	40	390	100	3.90	4
The apps contain relevant law cases regarding to construction industry	3	7	13	40	37	383	100	3.83	9
Government's historical construction data is easily retrieved and current	3	3	18	33	43	390	100	3.90	4
Current PWD procurement & tendering process clearly highlighted in the apps	3	3	13	38	43	393	100	3.93	3
The apps help students in gathering information for assignments	3	3	13	41	40	390	100	3.90	4
This apps help students in understanding government contract	3	3	13	41	40	390	100	3.90	4
This apps provide a convenient and attractive way to learn about public work department practices	3	3	10	40	44	403	100	4.03	1
This apps have potential to be further applied for construction industry players	3	3	13	44	37	387	100	3.87	8

Note: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree, AI=Average Index, R=Rank

5. CONCLUSION

The use of mobile apps for construction contract management not only enhances accessibility and ease of use but also aligns with the evolving digital landscape. By transitioning from traditional printed documents to mobile apps, construction practitioners can access contract information anytime, anywhere, fostering greater efficiency and effectiveness in contract administration. Moreover, the interactive nature of mobile apps allows for enhanced engagement, fostering a deeper understanding of construction contracts and their management.

The i-PWD mobile apps play a critical role in transforming the teaching and learning experience for construction-related subjects. They offer flexibility, accessibility, interactive features and collaborative opportunities that enhance knowledge acquisition and application. By using the i-PWD app, civil engineering and construction students can deepen their understanding of construction principles, while practitioners can stay abreast of industry advances. As technology evolves, mobile

apps are becoming indispensable tools for construction education and professional development, enabling people in the industry to compete in an ever-changing landscape.

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