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Technology Adoption Among Town Planners in Malaysia

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Abstract: The integration of technology in the planning practices of the Malaysian construction industry has significantly transformed how planners approach the development process. The objective of this research is to examine the extent to which technology has been adopted in planning practices in Malaysia. To accomplish this, a mixed methods approach was used, which involved distributing an electronic survey form to the members of the Malaysian Institute of Planners (MIP). The study has revealed three important findings. Firstly, for software adoption rates, the majority of respondents used basic storage, communication, CAD, graphic design, and GIS software with varying skill levels. On the other hand, hardware adoption rates were lower, likely due to financial constraints, and most respondents had average skills in operating GPS, drones, remote sensing, cloud computing, and 3D printing hardware. Secondly, the annual budget for most organisations was below RM30,000, with software subscriptions accounting for the largest budget allocation. Lastly, financial resources, a lack of skilled workers, and network constraints were identified as the biggest challenges faced by planning agencies in adopting technology. The research suggests that providing grants for technology adoption for small firms and local authorities, standardisation of systems, and flexible data sharing can increase productivity in planning activities across agencies. In summary, planners must adapt to technology due to the increasing demand for new development. Effective data management is required for decision-making. Malaysia's government and planners are willing to adopt technology for increased productivity, and recent developments such as I-Plan and OSC 3.0 Plus Online demonstrate a commitment to data-driven decision-making. There is still much to learn and improve for planners in the public and private sectors to contribute to the success of the construction industry in Malaysia.

Keywords: Technology adoption, planning practice, software, hardware, construction

1. Introduction

Technologies have continuously evolved and emerged over time, fundamentally changing how planners plan, develop, and manage the development process. As part of professional practices in the construction industry, planners are increasingly encouraged to adopt information and communication technologies in their work. This paper aims to explain the relationship between technology adoption and planning practices. The review focuses on the role and function of planners as key professionals in the construction industry, as well as the scope of planning in the construction process.

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Additionally, the paper emphasises the current state of technology application in planning practices in Malaysia and its importance in making planning and decision-making more effective.

2. Literature Review

Planning practice, in general, is highly involved in the process of managing and controlling the use of different categories of land. To assist planning authorities, spatial data is required, including the boundaries of each parcel of land, buildings and structures on site, and ownership information. When combined with socio-economic and environmental data such as demography and household income, this information can provide comprehensive and sound insights that public planners and decision-makers can use to improve spatial development and ensure more effective planning and operational decisions.

This literature review covers the general definition and concept of technology adoption, planning practices and processes, particularly in the Malaysian context, and the current state of technology adoption by planning authorities in Malaysia. The section concludes by explaining the factors that influence the adoption and utilisation of technology by planning authorities, particularly in decision-making.

2.1 Concept of Technology Adoption

There is an increasing need and interest in adopting technology in professional practice in the construction industry. It is based on the fact that scholars view technology as an instrument and medium that facilitates the coordination process between multiple data, documents, and actors involved in a construction process, thus reducing time and cost consumption and enhancing the capability to make better decisions (Toole, 2003).

In general, a decision made by an individual to adopt a technology usually follows the adoption theory, which examines an individual's readiness and choice to accept or reject a particular technology. One of the common factors that influence technology adoption is technology literacy. Even though discussion on the application of technology is frequently associated with an organisation, an individual's adoption pattern exemplifies the successful implementation of technology (Straub, 2009).

Conceptually, adoption terminology refers to an individual's behavioural change. The study of human behavioural change has been conducted from various perspectives, like health (Evidence Based Work-Group, 2005), education (Pennington, 2004), sociology (Deffuant *et al.*, 2005), and innovation and technology (Venkatesh *et al.*, 2003). Nonetheless, it appears that the terms adoption and diffusion have been interchangeably used by past researchers in illuminating the concept of technology adoption, although the former and later terms have different meanings. Roger (1995), in his research, refers to diffusion as the stage where technology has expanded for general application.

Comparatively, the term adoption is used at the individual level, whereas diffusion indicates the adoption of technology at a higher level—the masses. Both terms display linkages where the adoption of technology by individuals or organisations will eventually lead to wider adoption of technology among the people, known as diffusion (Figure 1) (Sharma and Mishra, 2014).

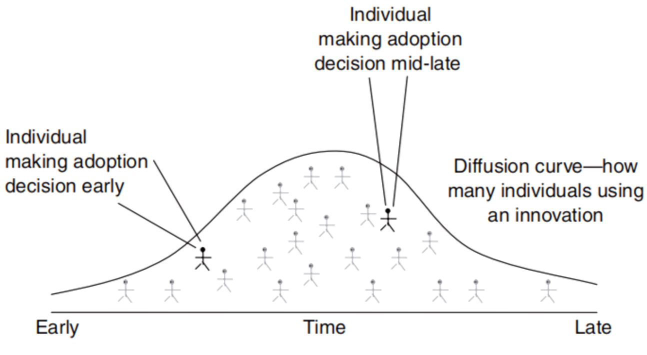

Fig. 1 - How Individual Adoptions Compose Diffusion
Source: Sharma and Mishra (2014)

2.2 Technology Adoption in Planning Practices

Technology became increasingly important in the construction industry following the impact of urbanisation, thus resulting in spatial development, especially in urban areas that are rapidly growing. As the planning process involves the preliminary evaluation of a construction process, it is fundamental for planners to adapt to technology in their operational practices to ensure that planning designs, reports, and documents are of good quality and are cost-effective on time. From the perspective of public planners, technology helps in making the best possible planning decision.

Planning practices need to be adaptive to the continuously changing settings, predominantly in the city domain, to ensure they can sustainably meet future needs (Boelens and Roo, 2014). Therefore, embracing the new technology available today will help planners address all the challenges that surround the rapid development of cities.

> "*The use of technologies generates the progress and development of the country, by identifying the problem, solving it and reaching a major framework that supports urban management in a better, accurate way with less effort. It also achieves smart management that urban administration seeks to find optimal urban sustainability and development.*"
>
> *Mahmood and Mahdi (2021)*

Furthermore, technology adoption in planning practice will promote collaboration and engagement between professional planners, other professionals, and stakeholders. A decision will be deliberated according to consistent communication, attention to detail, and a data-driven process, which are essential following urbanisation challenges like rapid growth, climate change, and the expansion of urban boundaries (Lapointe, 2014). Subsequently, scholars (Lapointe, 2014; Mahmood and Mahdi, 2021) have underlined the importance of technology to planning practice, which includes:

i. Adapting technology to planning practices will prospectively establish the best instrument and tool to achieve sustainability in society and the environment. The technology potentially provides data on the number of calories burned to move from one place to another. In contrast, developers can use technology to help design urban spaces that incorporate walkability principles to reduce the dependency on private vehicles among communities.
ii. Technology adoption contributes to improving the level of connectivity in housing and commercial areas. It allows one to work from home or other places, which substantially reduces time spent on the road and improves traffic volume and flow. As technology becomes essential within the urban setting, planners can ensure this aspect is met in new developments.
iii. The availability of technology and data helps planners forecast and plan future spatial development, including housing, industry, and services. Technology and data help to recognise the spatial predictions for land uses in an area.
iv. Cities emerge as the centres where data sharing, open data, and collaboration take place. Technology provides extensive participatory and collaborative platforms, enabling planners to tap into resources and information worldwide.
v. Technology helps planners successfully design and plan the layout of spatial development, predominantly in city centres, effectively incorporating the community's interests and needs.

A recent study conducted by Son T.H., Weedon Z., Yigitcanlar T.,*, Sanchez T., Corchado J.M., and Mehmood R. (2023) explored the utilisation of AI in achieving smart and sustainable development through a comprehensive literature review. The study produced four key findings: (a) Individuals who employ AI in real-world scenarios to plan urban areas are enabling the adoption of AI by local governments; (b) Collaborative efforts and partnerships among diverse groups are essential to encourage greater adoption of AI; (c) Big data plays a crucial role in effectively utilising AI for urban planning purposes, and; (d) The integration of AI and human intelligence is of utmost importance in effectively addressing urbanisation issues and achieving smart and sustainable development in cities.

In summary, the adoption of technology in planning practices will eventually enhance the efficiency and effectiveness of the planning process, which is part of the construction process. More information and data can be gathered, thereby helping planners plan and make better decisions grounded in current and future land development scenarios. Moreover, advanced planning services can be offered to meet the present needs of the construction industry.

2.3 Importance of Technology Adoption in Malaysian Government Policy

Apart from looking at the importance of technology to increase productivity and effectiveness in development planning, as previously stated by researchers, the importance of technology application in development has also been emphasised by governments, including Malaysia. It can be seen through government policies that emphasised the use of technology as a medium to increase productivity and services following the Fourth Industrial Revolution (4IR). This paper focuses on some of the prominent policies that guide the government's implementation of technology in professional practice.

The government has underlined technology as a catalyst for improving productivity, especially in building more inclusive and sustainable development towards the 4IR. This statement is substantiated through the Sustainable Development Goals (SDGs), where both Goal 8 and Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation—focus on developing inclusive and sustainable economic and human capital based on infrastructure and technology development (United Nations, 2020). These two goals can be achieved through several strategies, including updating and diversifying technology to increase human capital productivity. Furthermore, the construction and provision of more extensive and sustainable infrastructure ensures access to technology for society.

At the national level, various government policies enhance technology adoption in the government's effort to increase the effectiveness of the government sector and services and the industrial sector in line with technological and innovation advancement following the 4IR. The Twelfth Malaysia Plan has highlighted the need to improve digitalisation and technology adoption to strengthen the national economy and encourage more inclusive development. This has the potential to be achieved through R&D&C&I by ensuring the right ecosystem can be provided, along with providing comprehensive digital infrastructures and services. Digital inclusiveness is also one of the key aspects emphasised in the Twelfth Malaysia Plan, where equity in gaining opportunities to participate and receive benefits from digitalisation is also included. In addition, the preparations for the 4IR will be enhanced by incorporating the application of technology in new developments (Economic Planning Unit, 2021).

The 4IR presents the dynamism and evolution of technology, thus displaying the increasing technology dependency in both economic and social sectors. The government has acknowledged the importance of technology adoption in future development, which is perceived in the vision of the National Fourth Industrial Revolution (4IR) Policy to drive the country to achieve balanced, responsible, and sustainable growth by emphasising technology and innovation application. A number of strategies are outlined in the National Fourth Industrial Revolution (4IR) Policy to help the government achieve the vision, which includes equipping future talent with 4IR-based skills; improving the skills among civil servants and professionals; strengthening the digital infrastructure for the government sector and strategic projects; promoting 4IR technology and innovation in solving social and environmental-related issues; and strengthening the use of 4IR technology in formulating and implementing policies, including the provision of services by government agencies (Economic Planning Unit, 2021).

Apart from the National Fourth Industrial Revolution (4IR) Policy, the Malaysian government's effort to make Malaysia a high-technology country can be exhibited by formulating the National Science, Technology, and Innovation Policy (DSTIN) 2021-2030. DSTIN 2021-2030 has further strengthened the government's aspiration to make technology a catalyst for sustainable economic development. Among the thrusts that have been identified to support this goal is to ensure more responsive governance of science, technology, and innovation, mobilising all stakeholders in R&D&C&I, including academia and society, to enhance the capability of developing cutting-edge technologies. Moreover, producing more competent and adaptable Science, Technology, and Innovation (STI) talents and cultivating the aspect of adopting technology and science among the community will prospectively contribute to the achievement of the DSTIN 2021-2030 goal (Ministry of Science, Technology, and Innovation, 2021).

Furthermore, the strengthening of technology's role in urban planning and development can be substantiated by the third principle of National Urbanisation Policy 2 (NUP2), which is to create a more competitive urban economy. It aims to encourage firms and institutions, including the government, to be more creative and innovative, thereby increasing urban communities' knowledge and national productivity (Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, 2016).

3. Research Method

The adoption of technology is measured based on the application of software and hardware to complete tasks related to planning activities. This research also focuses on investigating current challenges and possible new technologies that could enhance the work productivity of planners. A mixed research approach was adopted in the data collection and analysis stages.

3.1 Samples and Sampling Technique

The research samples were drawn from the member lists of the Malaysian Institute of Planning (MIP) and Lembaga Perancang Bandar Malaysia (LPBM) for the year 2022. The MIP member list, which consisted of 2,364 members, was used as a sampling frame to provide a wider range of respondent categories that included corporate and graduate members. In contrast, the LPBM had only 906 members. Simple random sampling was chosen as the data collection method for this research because it allows for the selection of a representative sample from the entire population of town planners, regardless of their category. This method ensures that each planner has an equal chance of being selected, providing an unbiased and reliable estimate of the population parameters.

3.2 Questionnaire Design

The research instruments were designed to adapt to subject-completed instruments or self-administered surveys to prevent the possible transmission of COVID-19. The electronic survey form was designed with a user-friendly interface and main contents using Google Forms. It provides details on the research aim, objectives, and scope of the study, as well as instructions for the respondent to participate in the survey. The questionnaire includes two types of questions: closed-ended and open-ended.

The closed-ended questions assess the respondent's experience/opinion on technology adoption using a 5-point Likert scale. The open-ended questions gather information on respondents' opinions and suggestions based on certain themes. The questionnaire is divided into four main sections. The first section collects information on the respondent's profile, such as age, membership category, working experience, sector, and scope of work. The second section identifies software and hardware application/adoption rates, which are categorised into nine types of software and eight types of hardware. The third section focuses on the cost of technology adoption, and finally, the fourth section explores the challenges and potentials of technology adoption.

3.3 Questionnaire Distribution

The survey form was emailed to MIP members on December 28, 2021, and the survey period ended on February 24, 2022. To encourage participation, MIP members who completed the survey were awarded one CPD point. A total of 258 questionnaires were collected at the end of the survey period, but only 236 were accepted after the data cleaning process. This research applied a 95 percent confidence level with a 6 percent margin of error.

4. Result and Discussion

4.1 Software Adoption Rate

Figure 2 shows that the majority of respondents (66.7 percent and above) reported using four (4) main software programmes: basic software, storage software, communication software, and CAD software. Notably, the majority of the respondents reported using graphic design software and GIS software. The respondents reported having average to good level (mean score 3 to 4) skills depending on the complexity of the software, with basic software being the easiest and 3D and simulation software being the most complex (Table 1). Additionally, different organisations showed varying patterns of software adoption: i) governmental agencies, private firms, and universities commonly use graphic design, CAD, and GIS software; ii) universities had the highest adoption rate for 3D software, followed by private firms; and iii) statistical software is mainly used in universities.

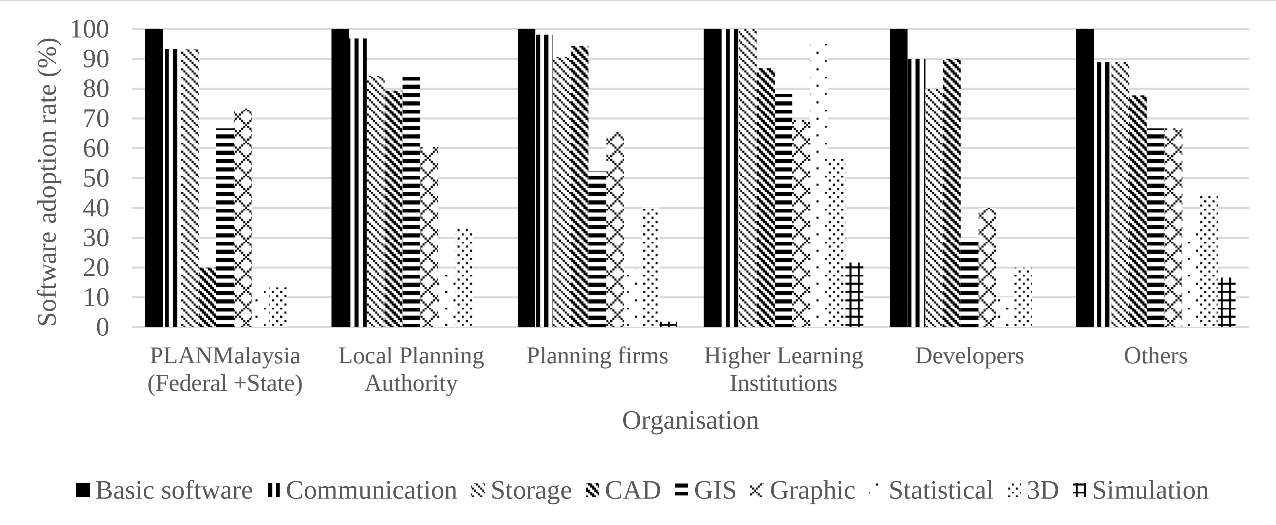

Fig. 2 - Software adoption rate

Table 1 - Skills in using software

Hardware skill	Frequency (Percentage)					Mean
	Excellent (5)	Good (4)	Average (3)	Poor (2)	Very poor (1)	
Basic Software	101 (42.8)	98 (41.5)	32 (13.6)	3 (1.3)	2 (0.8)	**4.2**
Storage Software	58 (27.5)	96 (45.5)	52 (24.6)	3 (1.4)	2 (0.9)	**4.0**

Communication Software	61 (26.8)	110 (48.2)	47 (20.6)	8 (3.5)	2 (0.9)	**4.0**
Graphic Design Software	11 (7.3)	70 (46.4)	61 (40.4)	9 (6)	0 (0)	**3.5**
Computer Aided Design Software	36 (18.3)	84 (42.6)	59 (29.9)	14 (7.1)	4 (2)	**3.7**
Geographic Information System (GIS)	13 (8.6)	50 (32.9)	65 (42.8)	18 (11.8)	6 (3.9)	**3.3**
3D Software	4 (4.5)	18 (20.2)	38 (42.7)	23 (25.8)	6 (6.7)	**2.9**
Statistical Software	8 (12.5)	28 (43.8)	23 (35.9)	5 (7.8)	0 (0)	**3.6**
Simulation Software	0 (0)	2 (20)	6 (60)	1 (10)	1 (10)	**2.9**

4.2 Hardware Adoption Rate

The adoption rate for hardware is significantly lower than that for software. For almost all hardware types (except basic hardware), the adoption rate is 50 percent or below (Figure 3). Furthermore, the findings indicate that the respondents have average skills (mean score 3±) in operating GPS, drones, remote sensing, cloud computing, and 3D printing hardware but poor skills in operating AR and VR devices (Table 2). Across organisations, the adoption rate for most types of hardware shows a similar pattern and is relatively average to low. This situation is likely due to cost limitations that prevent the purchase of sophisticated or large-scale hardware, particularly for small-scale organisations.

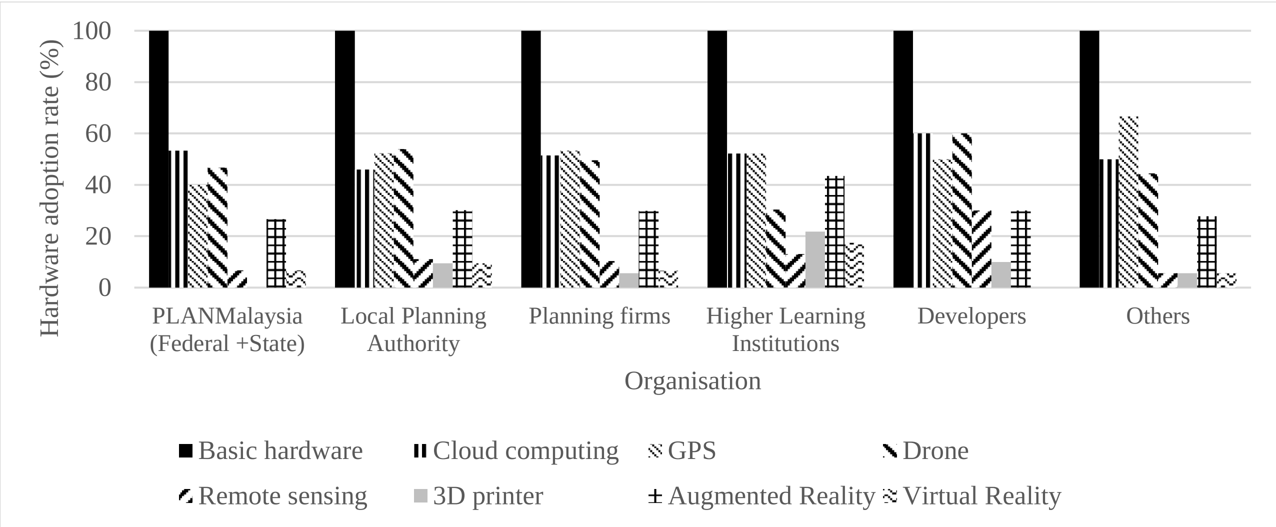

Fig. 3 - Hardware adoption rate

Table 2 - Skills in using hardware

Hardware skill	**Frequency (Percentage)**					**Mean**
	Excellent (5)	**Good (4)**	**Average (3)**	**Poor (2)**	**Very poor (1)**	
Basic Devices	100 (42.4)	89 (37.7)	42 (17.8)	4 (1.7)	1 (0.4)	**4.2**
Global Positioning System (GPS)	22 (17.6)	49 (39.2)	44 (35.2)	9 (7.2)	1 (0.8)	**3.7**
Drone	11 (9.6)	25 (21.7)	60 (52.2)	16 (13.9)	3 (2.6)	**3.2**
Remote Sensing Devices	3 (11.5)	5 (19.2)	14 (53.8)	3 (11.5)	1 (3.8)	**3.2**
Cloud Computing Devices	13 (10.9)	51 (42.9)	42 (35.3)	10 (8.4)	3 (2.5)	**3.5**
3D Printer	2 (10.5)	8 (42.1)	5 (26.3)	3 (15.8)	1 (5.3)	**3.4**
AR Devices	5 (6.8)	19 (26)	23 (31.5)	18 (24.7)	8 (11)	**2.9**
VR Devices	1 (5.3)	2 (10.5)	8 (42.1)	7 (36.8)	1 (5.3)	**2.7**

4.3 Technology Adoption Rate (Software and Hardware)

The adoption rates for software and hardware were aggregated into three (3) categories to obtain an overall rate: Basic, Intermediate, and Advanced (Table 3). Software and hardware that had a majority of users (2/3 of respondents or 66.7 percent and above) were considered basic technology, with an average rate of 93.9 percent. On the contrary, software and hardware that had a minority of users (1/3 of respondents or 33.3 percent and below) were considered advanced technology, with an average of 14.9 percent. Finally, software and hardware that scored in the middle were considered intermediate technology, with an average rate of 53 percent. The three categories of technology adoption clearly differentiated the adoption pattern. Basic technology was commonly used in all planning agencies in Malaysia. Intermediate technology, on the other hand, was famously adopted in the private sector, while advanced technology was rarely used due to its lack of demand or requirement in planning practices. It was also considered complex and required a lot of resources, especially financial ones.

Table 3 - Technology adoption rate

Software	%	Hardware	%	Technology categories for planners	Average %
Basic	100	Basic	100	Basic technology (66.7 percent and above)	93.9
Communication	96.6				
Storage	89.4				
CAD	83.5				
GIS	64.4	GPS	53	Intermediate technology (33.4 to 66.6 percent)	53
Graphic design	64	Cloud	50.4		
3D	37.7	Drone	48.7		
Statistical	27.1	AR	30.9	Advance technology (33.3 percent and below)	14.9
Simulation	4.2	Remote sensing	11		
		3D Printer	8.1		
		VR	8.1		

4.4 Rating on Current Technology by Planning Agencies

Another way to examine the level of technology adoption in planning practice is to analyse the performance of existing technology by planning agencies in Malaysia: planning submission system, land use information system, social media, websites, complaints and notification system, traffic information system, and mobile apps (Table 4). The majority of respondents have access to the technology developed. However, the performance rating is between average and poor (mean score 3±).

Table 4 - Current technology rating

Current technology by planning agencies	Frequency (Percentage)						Mean
	Excellent (5)	Good (4)	Average (3)	Poor (2)	Very poor (1)	Not sure (0)	
Planning submission system (OSC Plus 3.0 etc)	36 (15.3)	119 (50.4)	54 (22.9)	11 (4.7)	4 (1.7)	12 (5.1)	**3.6**
Land use information system (i-Plan, SISMAPS, E-Tanah, etc.)	32 (13.6)	117 (49.6)	67 (28.4)	9 (3.8)	7 (3)	4 (1.7)	**3.6**
Social media (Facebook, Twitter, etc.)	45 (19.1)	112 (47.5)	61 (25.8)	10 (4.2)	4 (1.7)	4 (1.7)	**3.7**
Interactive website	24 (10.2)	108 (45.8)	75 (31.8)	15 (6.4)	7 (3)	7 (3)	**3.4**
Complaints and notification system	18 (7.6)	96 (40.7)	83 (35.2)	14 (5.9)	15 (6.4)	10 (4.2)	**3.2**
Traffic information system	15 (6.4)	79 (33.5)	80 (33.9)	25 (10.6)	12 (5.1)	25 (10.6)	**2.9**
Mobile apps (MyPlan, etc.)	20 (8.5)	100 (42.4)	69 (29.2)	19 (8.1)	11 (4.7)	17 (7.2)	**3.2**

The GIS data provided by I-Plan is fundamental, especially at the stages of plan-making and plan evaluation. It enhanced the availability and reliability of the spatial and land-use data (Ahmad and Mustafa, 2019; Yaakup *et al.*, 2005). In the development plan system, the usage of GIS is varied according to the hierarchy of the plans prepared. The development plan at the national level requires information on a wide range of land uses because it focuses only on the fundamental factors at the macro level. At the state level, the main interest of the State Structure Plan is the preparation of the key diagram that highlights areas that have the potential for future development and areas for conservation (Yaakup *et al*., 2005). The local plan, meanwhile, comprises lot-based GIS, which is the spatial information and land-use data of each land plot. This data helps the local authority determine and select suitable land and locations for future development like housing and commercial areas and evaluate the potential impact of this development on the environment and surrounding area (Yaakup *et al.*, 2005).

The adoption of technology in planning control systems is apparent following the establishment of OSC in all local authorities. The introduction of the OSC Online 3.0 Online system in 2011 by the Ministry of Housing and Local Government, followed by OSC 3.0 Plus Online in 2019, has stepped up the usage of technology in processing the planning and building plan approval by the local authority (Kamaruddin *et al.*, 2020). The introduction of an online system will enhance coordination between planners and other stakeholders. It also enables the PSP to receive the decision instantly, hence responding to the review by the local authority (CIDB, 2021; Kamaruddin *et al.*, 2020). Furthermore, it is anticipated that the recent OSC 3.0 Plus online will make the application process more user-friendly and efficient. Nonetheless, some improvements can be made by government agencies and planners in incorporating the technology, henceforth making the Malaysian planning and construction industry succeed in the national development agenda, that is, to make Malaysia more prosperous, inclusive, and sustainable (Economic Planning Unit, 2021).

4.5 Annual Budget and Distributions

The annual budget for most organisations is below RM30,000 and is primarily allocated for small-scale hardware purchasing and maintenance, as well as software purchases and subscriptions. Software subscriptions account for the largest budget distribution, ranging from 41 percent to 60 percent of the overall budget. The second largest budget allocation is for hardware purchases, maintenance, and upgrades, ranging from 21 percent to 40 percent of the overall budget. Finally, the lowest budget distribution (20 percent and below) is for system development, internet subscriptions, and staff training.

According to past research, technology application in planning practices will improve coordination and communication between planners and other stakeholders (Riggs and Clark, 2016; Riggs and Gordon, 2017). Technology also improves the capability of planners to prepare plans and documents and make better decisions (Lapointe, 2014). Put differently, technology adoption in planning practices enhances the efficiency and effectiveness of the planning process as part of the project lifecycle. The up-to-date data gathered will help planners plan and make better decisions. Furthermore, advanced planning services can be offered to meet the needs of the construction industry. The indispensable role of technology adoption in development has also been legislatively emphasised by the Malaysian government through government policies including the Twelfth Malaysia Plan, the National Fourth Industrial Revolution (4IR) Policy, the National Science, Technology, and Innovation Policy (DSTIN) 2021-2030, and the National Urbanisation Policy 2.

4.6 Challenges

Financial resources are the biggest challenge for most organisations, followed by a lack of skilled workers and network constraints. Other notable challenges include cyber security issues, the pace of technology advancement being too fast, a lack of management support, difficulty persuading top management to invest in technology, and some software having ridiculously priced subscriptions, so firms usually opt for a cheaper alternative with fewer features to work with. Additionally, there is a lack of awareness regarding the use of technology in organisations, as many still prefer traditional methods. There is also a lack of standardisation among local authorities with planning submission requirements, and training can be time-consuming. To increase productivity in planning activities across agencies, relevant suggestions include providing grants for technology adoption for small firms and local authorities, standardising systems, and allowing flexible data sharing.

5. Conclusion

The adoption of technology is essential for the construction industry to progress towards the 4IR. In planning practices, the adoption of technology can improve town planners' capability and productivity in preparing plans, documents, and reports associated with planning applications, making planning decisions more effective. This research aims to evaluate the technology adoption rate among planners in Malaysia through a systematic research process. The results can be used as a baseline for future research and to improve shortcomings and weaknesses found in technology adoption. Performance analysis of existing technology by planning agencies, costing, benefits, challenges, and the potential of future technology are included to provide the reasoning behind the baseline results.

In summary, professionals, including planners, must adapt to technology in their operations due to rapid urbanisation, which leads to increasing demand for new development to be constructed. The construction process involves several phases and multiple actors, making coordination and collaboration between planners and other stakeholders more challenging. Effective and efficient data management and analysis are required to facilitate the decision-making process. The Malaysian government and planners are showing willingness to adapt to today's information and communication technology, particularly in pursuing the 4IR. Although the government and professional planners have been slow to adopt technology, they are beginning to feel pressure to increase productivity, making modern and up-to-date technology a necessity. The development of the I-Plan as a geographical-based online database and the recent OSC 3.0 Plus Online demonstrate the promising sign and commitment shown by the Malaysian government to integrate more systematic and data-driven decision-making in planning practices. As new technologies are continuously introduced every day, there is still a lot for planners in the public and private sectors to learn and look forward to improving productivity levels, contributing to the success of the construction industry in Malaysia.

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