Journal of Engineering Research and Education
Volume 13, 2021 [61-72]

Intention to use Mobile Technology: An Extended Technology Acceptance Model

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ABSTRACT

More users have switched from using desktop computers to mobile devices. Mobile technology is changing the way people access information. Although mobile devices are highly flexible, accessible, and convenient, users still confront unresolved issues when rendering and navigating web content on mobile devices. The purpose of this study was to identify and examine the factors that influence the intention to use mobile technology. This article has reviewed several theories, namely: tam, the theory of media richness and diffusion, and innovation theory. The findings of this study have come up with a theoretical framework and several hypotheses have been proposed. Therefore, this article will contribute towards the adoption and advancement of mobile websites and guide the management of organisations related to website development and management. It provides web service providers and policymakers with a checklist of factors that appear to affect mobile web adoption.

Keywords: Mobile technology, convenient, compatibility, media richness

1. INTRODUCTION

The use of the World Wide Web (WWW) has seen a tremendous rise since its commercial application in 1994. The number of people and the amount of time spent on the Internet have been increasing in parallel with the growth of information and communication technology (ICT). One of the main activities on the Internet is to find information [1]. In a short period, the Internet has provided substantial market potential to the electronic market that allows a person to obtain information and communicate in an easier and more efficient way [2].

People's lifestyles have changed and keep changing with the emerging physical and non-physical technologies. In the same way, mobile devices are changing the way people access websites. More users have switched from using desktop computers to mobile devices. Smartphones and tablets are among the most popular mobile devices for accessing websites worldwide ([3]; [4]).

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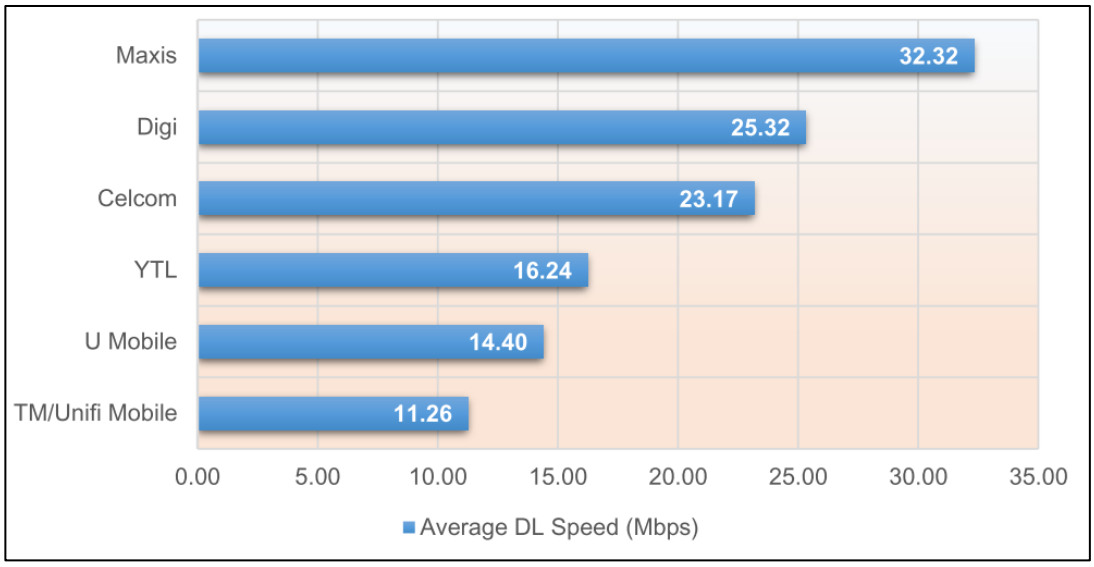

Figure 1. Wireless data transmission average download speed in 2019
Source: Malaysian Communications and Multimedia Commission (2019)

Simultaneously, mobile device usage has exceeded desktop computers in terms of accessing the Internet in Malaysia. Figure 2 shows the devices used to access the Internet in Malaysia in 2018. It shows that the Internet is mostly accessed through the use of smartphones, with nine out of ten Internet users who went online using the device (93.1%). This is an increase from 89.4% in 2016. The second most commonly used device to access the Internet is a laptop or netbook, with 44.2%. Meanwhile, the use of desktop computers to access the internet is only 28.1%. Twenty years ago, a laptop was considered a luxury item, and a desktop computer was the only mode of Internet access. The question of devices being used by Internet users to go online was almost irrelevant at that time [5].

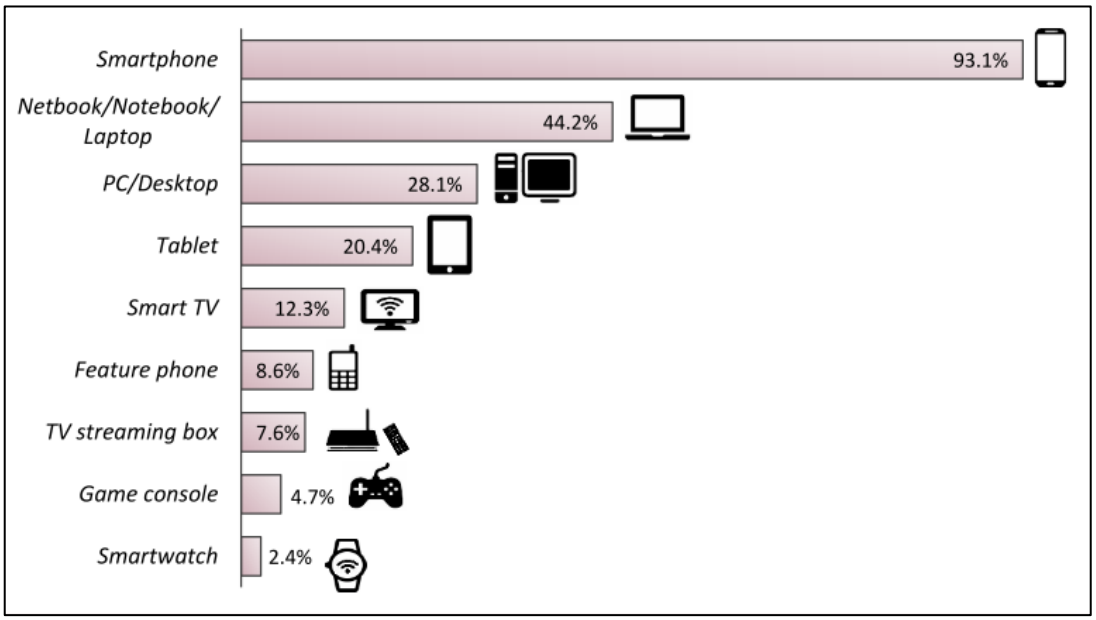

Figure 2. Devices used to access the Internet in Malaysia in 2018
Source: Malaysian Communications and Multimedia Commission (2018) [25]

2. INFORMATION TECHNOLOGY/INFORMATION SYSTEMS ACCEPTANCE RESEARCH BACKGROUND

Information technology acceptance can be defined as the demonstrable willingness to employ information technology for the tasks it is intended to support within a user group [6]. Acceptance of a technology is important because it is a vehicle that allows an individual to participate in a technology [7]. Previous research on IS has studied why and how new information technologies are adopted by individuals. There are numerous streams of research within this IS field. One of them concentrates on the technology acceptance of individuals by using intention as the dependent variable (e.g., [8]; [9]; [10]. Other streams have focused on the adoption and implementation of specific technologies at the organisational level (e.g., [11]. All these streams add significant contributions to the body of knowledge on information technology acceptance.

The theoretical models that have been reviewed and synthesised in this study have employed intention as the key dependent variable. This selection aims to understand actual usage, wherein intention is well established in the IT/IS discipline as the predictor of actual behaviour [12]. Scholars in the IT/IS discipline have developed a number of models and theories focusing on the acceptance and diffusion of technology. They presented constructs (factors) that predict the behavioural intention and usage based on individuals' beliefs. Some of the well-established models in the IS discipline are Innovation Diffusion Theory (IDT) [13], Theory of Reasoned Action (TRA) [14], Theory of Planned Behavior (TPB) [15], Technology Acceptance Model (TAM) [16], Unified Theory of Acceptance and Use of Technology (UTAUT) [12], Technology Acceptance Model 2 (TAM 2) [17], and Technology Acceptance Model 3 (TAM 3) [18].

One of the well-known models that can predict and explain IT/IS acceptance behaviour is TAM. Introduced by [16], this model is distinguished for its parsimony and explanatory power in the information technology field. Davis proposed that the perceived usefulness and perceived ease of use of an individual determine his or her behavioural intention to use information technology. TAM is broadly applied to innovations and technologies where the user intends to adopt a particular technology to fulfil specific needs or to accomplish certain tasks. TAM has been developed based on the theoretical foundation of a well-known psychological model, TRA. It is proven that causal linkages between belief, attitude, intention, and behaviour can significantly predict users' acceptance of technology.All the technology acceptance models and theories have their own main concept, which links user responses and intentions to the actual usage behaviour of technology. Figure 3 displays the underlying conceptual model presented by [12], clarifying acceptance of information technology that forms the foundation of most of the technology acceptance models. Well-known theories in the technology acceptance field will be reviewed in the next section. The review results in the identification of seven significant models.

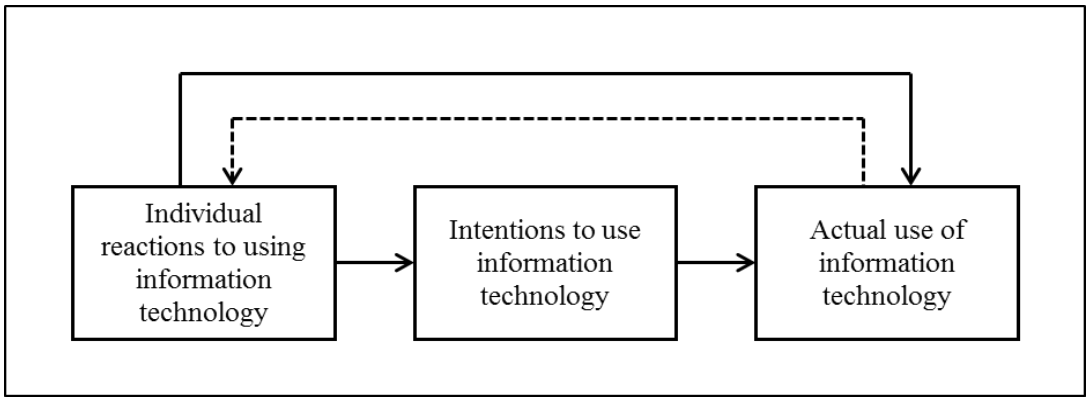

Figure 3. Basic concept underlying user acceptance models
Source: Adopted from Venkatesh et al. (2003)

2.1. Technology Acceptance Model

The Technology Acceptance Model (TAM) is one of the most extensively employed research models for studying technology acceptance [16]. TAM is adapted from TRA [14], where it provides a link between technology acceptance and usage behaviour. TAM posits that intention is the fundamental determining factor of actual usage. In turn, intention is determined by attitude. Meanwhile, attitude is influenced by an assessment of the perceived usefulness and perceived ease of use of a technology. According to Davis, perceived usefulness is "the degree to which a person believes that using a particular system will enhance his or her job performance" [16]. On the other hand, perceived ease of use is defined as "the degree to which a person believes that using a particular system will be free of effort" [16]. In addition, this model assumes that perceived ease of use will influence perceived usefulness, as a system will be perceived as more useful when it is easier to use [16].

The study conducted by [16] showed that the association between perceived usefulness and information system use is much stronger as compared to difficulties in using a system. It shows that users are ready to face the difficulties of use if they believe in the benefits of the system. According to [19], TAM is among the most popularly adopted and influential models in describing a person's information systems acceptance because it proposes a small number of determinants in predicting system use. Originally, TAM and its extensions, such as TAM2, were built to support managing management information systems (MIS) activities at the workplace or in organisations by measuring the quality of delivered systems and addressing the central concern of IT adoption and use in organisations [17]. Due to this, most of the studies related to TAM used organisations as samples to investigate IT and IS implementation. However, TAM has also been applied to study individual adoption, especially when concerning individual differences and social influence [17]. Studies that used individual consumer samples in non-work settings are fewer than studies that focused on organisational settings, where they give more importance to job relevance, mandatory or voluntary organisational settings, work experience, and management influence. Therefore, it is still worthwhile to examine this model to predict individual, non-work-related adoption behaviour.

According to [20], TAM is the most influential model because it proposes a small number of determinants that are straightforward, simple, and specific and can be manipulated through implementation and system design. According to [21], TAM is considered to be a robust, flexible, and strong model in relation to any information technology. It provides a relationship between the acceptance of any new technology and the behaviour of the users of that technology. Many researchers have employed TAM in their studies and proved that the tools used with the model are statistically reliable ([22] and [23]). In general, this model has been employed in explaining individuals' initial intentions to use technology. However, [24] explains that this model can also be employed to predict the behaviour of users who already have experience of using a technology. Figure 4 shows the theoretical framework proposed by [16].

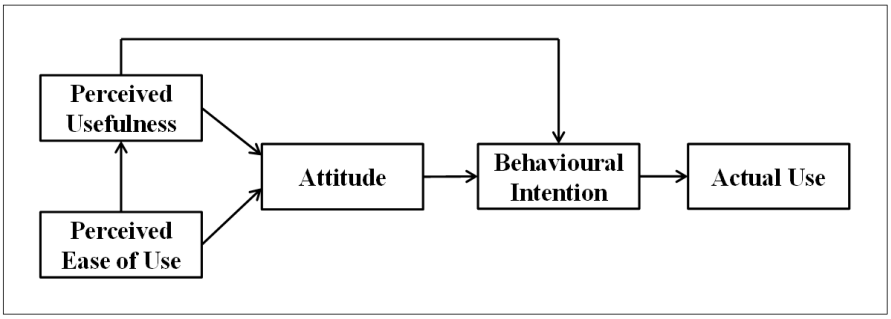

Figure 4. Technology Acceptance Model

2.2. Diffusion of Innovation Theory (IDT)

The Diffusion of Innovation Theory (IDT) explains why, how, and at what rate individuals, as well as society, accept or reject a new innovation or idea. IDT was established in 1983 by Rogers and the author defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. xviii). According to IDT, innovations are transferred through communication channels within a particular social system over time, and these channels can influence the adoption decisions of individuals. Even though most of the innovations offer their adopters superior ways to tackle everyday issues, the uncertainty with regard to whether the new ways will be better than the current ones has become an obstacle to adoption [24]. IDT serves as the fundamental theoretical basis of innovation adoption research, utilised to study the acceptance of information technology over the prior decades [25].

The way towards adopting an innovation has five chains of stages in the diffusion [26]. The first stage is knowledge, in which a potential adopter must gain knowledge of the innovation. The second stage is persuasion, where he or she will form an attitude towards the value of the innovation. The third stage is the decision, where he or she decides to adopt or reject the innovation. Stage number four is the implementation of innovation. The final stage is confirmation of the decision.

According to [26], five technology attributes significantly shape the adoption of innovation, namely relative advantage, complexity, compatibility, observability, and trialability. Each of these attributes aids in decreasing the uncertainty of possible adopters regarding the perceived benefits of innovation adoption. Relative advantage can be defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (p. 15); compatibility is the "degree to which an innovation is perceived as consistent with the past values, past experiences, and needs of the potential adopters."

Based upon IDT, [26] identified three groups of adoption predictors at the organisational level, namely: external characteristics of the organisation, internal characteristics of the organisational structure, and individual (leader) characteristics. The external characteristic of the organisation refers to system openness. The internal organisational structural characteristics consist of centralisation, formalisation, interconnectedness, complexity, organisational size, and organisational slack. Individual characteristics describe the leaders' attitude towards innovation and change

towards organisations [26]. The more interactions there are between the organisation and its external environment, the more likely it is to adopt survival innovations.

2.3. Media Richness Theory

Media richness theory was developed in the mid-1980s by organisational scholars Daft and Lengel (and later with Trevino) and became very popular along with the diffusion of electronic communication media (e.g., email in the 1990s). The theory suggests the effective use of a communication channel (medium) by matching the richness of the medium with the equivocality of the task. The developers of the theory paid attention to the significance of uncertainty and equivocality reduction in successful information processing in organisations [27]. More specifically, uncertainty is the lack of information, which can be reduced by the quantity or amount of information. In contrast, equiv-ocality refers to confusion or lack of understanding, which cannot be reduced by the amount of information but can be reduced by the quality or richness of information [27]. In a mediated situation using a communication technology such as email, uncertainty reduction would not be a problem because technology can carry a large amount of information to reduce uncertainty.

On the other hand, equivocality reduction, on the other hand, would be problematic, primarily due to the lack of nonverbal cues inherent in mediated communication. Thus, the theory determines the "richness" of a medium based on the availability of (a) immediate feedback, (b) multiple cues, (c) language variety, and (d) personal focus. Based on these four criteria, the original theory ranked face-to-face as the richest medium, followed by the phone, written addressed documents (e.g., memos, letters), and unaddressed documents (e.g., flyers). Thus, for a high level of equivocal task, such as an explanation of a complicated technical matter, face-to-face, the richest medium, would be most effective. Whereas for a low level of an equivocal task, such as giving numerical data requested, a lean medium (e.g., an unaddressed document) would be most effective. The most important premise of the authors, which is often overlooked by the audience, is that effective managers can select the most appropriate medium by successfully matching the richness of a medium to the level of equivocality of the task [27].

Along with the advancement of technology, various communication channels have become available. Constantly evolving technology, specifically the rapid diffusion of mobile devices, has significantly altered communication in recent years. It has, thus, opened doors for potential areas of study. The use of a particular channel and its outcomes has been the interest of many scholars and practitioners, and we see a plethora of research in diverse contexts. Despite criticisms of oversimplified channel selection, the media richness theory has gained prominence in almost every aspect of life since its inception several decades ago.

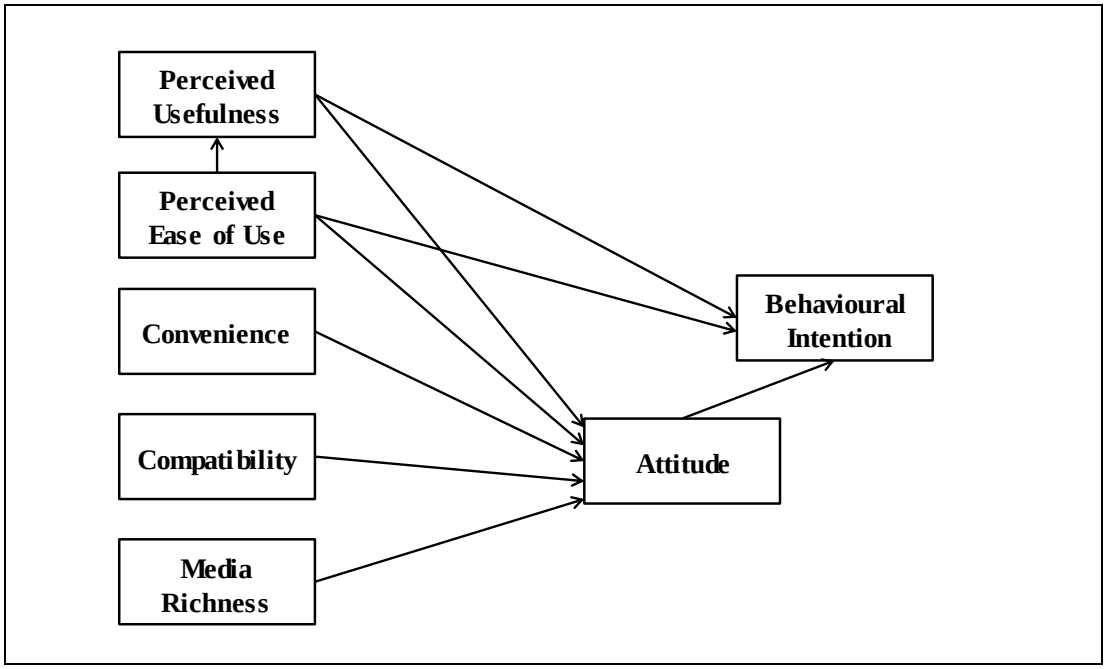

Figure 5. Research Model

The research framework and hypotheses are developed based on a thorough review of the literature. The following table (Table 1) shows the summary of research hypotheses that will be tested in the current study.

Table 1. Summary of hypotheses

Number	Hypothesis
H1	Perceived usefulness will have a positive effect on the behavioural intention to use mobile web
H2	Perceived usefulness will have a positive effect on the attitude towards using mobile web
H3	Perceived ease of use will have a positive effect on perceived usefulness
H4	Perceived ease of use will have a positive effect on the intention to use mobile web
H5	Perceived ease of use will have a positive effect on the attitude towards using mobile web
H6	Convenience will have a positive effect on the attitude towards using mobile web
H7	Compatibility will have a positive effect on the attitude towards accessing mobile web
H8	Media richness will have a positive effect on the attitude towards accessing mobile web
H9	Attitude will have a positive effect on the intention towards accessing mobile web

3. DISCUSSION AND CONCLUSION

This article reviewed the existing literature on mobile web adoption studies and the behavioural intention area. The literature review revealed that a need exists to study the determinants that influence mobile web adoption since mobile devices have their own uniqueness and have gained immense importance among users. By identifying factors that influence attitude and intention towards accessing mobile websites, web developers are able to produce web pages that will meet the expectations of users. In this article, theories and models in the technology adoption field were reviewed in order to identify the most suitable theoretical framework for this study. The most relevant factors that have been identified in the mobile web literature are integrated in this study as they are considered to be the most applicable to the adoption of the mobile web. Finally, the researcher hypothesised the relationships between the selected variables.

A theoretical framework is a belief in how certain phenomena (or variables or concepts) are related to each other (a model) and an explanation of why it is believed that these variables are associated with each other (a theory) [28]. [28] suggested three important components of a good theoretical framework. First, the phenomena (or variables) should be clearly defined. Second, the relationships between the phenomena (or variables in the model) should be given. Third, strong explanations should be established for why the proposed relationships exist.

A theoretical model of the current research is developed based on TAM and some determinants from Innovation Diffusion Theory (IDT) and Media Richness Theory. TAM is well known for its explanatory power in the information systems field. Moreover, TAM has been utilised in numerous technology acceptance studies. Adapted from the Theory of Reasoned Action [13], TAM appears to be a promising way to overcome the problem of underutilised systems as well as to explain the relationships among factors affecting user technology acceptance ([23]; [16]; 29]). Based on TAM, the behaviour of an individual adopting information technology will be affected by their beliefs about perceived usefulness (PU) and perceived ease of use (PEOU).

[30] argued that the intention to use should be used instead of actual usage behavior, and there is substantial evidence that the intention to perform a behaviour predicts actual behavior.[31] found that behavioural intention to use the system is significantly correlated with usage and that behavioural intention is a major determinant of user behavior, while other factors influence user behaviour indirectly through behavioural intention. In a review of previous studies, [32] suggested that intention can be used as an indicator for predicting actual system use. This statement is supported by [33], who stated that actual use can be excluded when a studied technology is still in the adoption stage.

[34] held the same view, believing that when a studied technology is still in the development stage with limited users, there is no need to include the variable of actual use in the model framework. Therefore, considering model parsimony and the newness of the mobile web, this study removes the actual usage behaviour variables from TAM, examining the impact of perceived usefulness and perceived ease of use on attitude and intention to use.

Although TAM is widely used to explain technology acceptance, extensions are required to further examine behavioural intentions towards mobile web adoption. This is because perceived ease of use and perceived usefulness do not sufficiently explain behavioural intention ([7]; [35]). In addition, the existing technology adoption theories are unable to provide a sufficient and accurate understanding of behavioural intention when human-oriented interaction is involved with mobile-related technologies (mobile web in the current study) [35]. Therefore, research scholars recommended TAM be extended in order to explain individuals' adoption of a technology.

With the aim of addressing this gap, the TAM model is extended by integrating the most relevant factors that have been identified from Innovation Diffusion Theory (IDT) and Media Richness Theory that are considered to be the most applicable to the mobile web adoption ([36]; [37]; [38]; [39]; [40]; [33]; [41]; [42]). These constructs include convenience, compatibility, and media richness. Convenience has become increasingly important to consumers, especially in the context of ICT adoption. [37] stated that convenience is a crucial element in regards to saving consumers' time and effort, where it is believed that time and effort are the main aspects that affects consumers' convenience. Still, a little studies have been conducted to outline how convenience could be defined or examined in the mobile service field [42].

Meanwhile, compatibility is the degree to which an innovation is perceived as being consistent with the existing values, demands, and past experiences of potential users [26]. Previous findings have proved that compatibility is a crucial element that determines whether an individual is willing to adopt innovations. ([36]; [43]). Internet users can access websites at any time by using mobile devices. Therefore, it is expected that users are expecting mobile websites to be compatible with their daily lifestyle. Media richness, on the other hand, is the ability of a communication medium to reproduce the information sent over it [33]. This study views mobile devices as a new way to access the Internet, particularly websites where the contents are sent through wireless networks. Media richness is expected to influence the adoption of the mobile web. Therefore, this study will develop and examine a theoretical model extended from TAM in the mobile web adoption context by incorporating multiple constructs.

The main focus of this research is to identify the factors that influence users' intention to access web pages through mobile devices. The research framework for this study has been developed as shown in Figure 5, where this integrated framework is developed based on the research problems. According to the research framework, behavioural intention is used as the dependent variable in this study. On the contrary, perceived usefulness, perceived ease of use, convenience, compatibility, media richness, and attitude are chosen as the independent variables for this study.

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