

Extending Classical Technology Acceptance Models, A Review of Potential Mobile Device and Consumer Individual Factors to Better Explain Mobile Commerce Acceptance

“A review that elaborates on consumer individual and mobile device specific factors to enable the creation of more specific models for M-Commerce Acceptance”

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<i>Article History</i>	<i>Abstract</i>
<p>Article Submission 30 December 2022</p> <p>Revised Submission 29 January 2023</p> <p>Article Accepted 02 March 2023</p> <p>Article Published 30 March 2023</p>	<p>Purpose - Technology adoption theories are very general, however the factors influencing acceptance could vary on the specific technology and the segments of consumers with their individual traits. This study accomplishes a comprehensive review of literature and to find potential variables to extend classical technology acceptance models specifically in the contexts of mobile technology and mobile commerce with consumer individual traits in mind.</p> <p>Methodology - 1. Methodical Review of key journal articles on Technology Acceptance across multiple key publishers, 2. Review of popular extant models in the context of general technology, 3. Elicit Mobile and Consumer specific considerations 4. Identify theories relevant to mobile devices and consumers as individuals</p> <p>Result - The result showed that the three were multiple mobile device/ commerce and consumer related theories including convenience, perceived risk, trust and deal proneness</p> <p>Study Implications - The theories and the constructs identified in this review could be used by future researchers working to further the acceptance science in the context of mobile devices taking consumer individual factors into consideration.</p> <p>Keywords- Technology Acceptance, UTAUT, Trust, Performance Expectancy, Behavioral Intention, Mobile Technology, Deal Proneness, Innovativeness, Mobile Commerce, M-commerce, E-commerce.</p>

I. Introduction

1.1 An Introduction to Technology Acceptance (TA)

The mechanism through which people or organizations adopt and incorporate new technologies into their daily lives or activities is referred to as TA. It entails comprehending and assessing the variables that affect the acceptance and utilization of technology in addition to the attitudes, convictions, and actions of users. In the area of information systems, where academics have created numerous concepts and theories to explain how and why people accept or reject new technology, the concept of TA has received a great deal of attention.

1.2 Importance of Technology in terms of problems it tries to solve

Technology solves many problems in different contexts and acceptance is pivotal to driving those solutions and to continuously improve. Technology Acceptance is important for multiple stakeholders, including researchers, policy makers, and businesses that maximize ROI by increased adoption. Technology acceptance is an indicator of national growth as a key driver of innovation, and it also helps the technology enablers and designers to better understand gaps, improve technology solutions, and enhance user experience. It is particularly important for organizations driving E-commerce solutions as acceptance would improve transaction volume.

1.3 Introduction to M-commerce and its new aspects in ‘mobile’ and ‘mobile consumer’

Mobile Commerce also known as Mobile business refers to any variant of commercial activity executed over internet using a mobile device (Purnomo et al., 2022). where the term “mobile” implies a round the clock access to commercial operations via mobile appliances (Ivanochko et al., 2015) and a means by which online purchasing could be done without a computer (Shih & Chen, 2013). Mobile devices have therefore extended a number of aspects of E-commerce business model as it is possible for mobile device-based business models to assist with confidentiality and provide services based on geo location (Liu,2011). Mobility has created a totally new dimension for online commercial transactions due to its ubiquity and the ways in which users perceive and are able to interact with the technology and therefore the acceptance of mobile commerce needs to be looked at from a different angle and extension is required to the classical theories of adoption (Min et al., 2008). While E-commerce is carried out via Internet or LAN using a PC or laptop computer, commonly indoors and for work purposes, M-Commerce has the features of being useful over various wireless networks, being used out of work and during leisure time in many environments where ubiquitous communication at any time or location extended with numerous types of location based and highly personalized applications (Min et al., 2008). Therefore it is very important for the M-commerce driven business models to have a better acceptance model to explain acceptance of M-Commerce and this would benefit multiple stakeholders by maximizing ROI, developing National Economy, providing a better framework for policy makers to make decisions and providing future researchers who wish to extend M-commerce acceptance researchers a direction and literature to further the knowledge domain.

II. Theoretical Review of Technology Acceptance

The renowned and prominent hypotheses in the area of technological acceptance was put forth by Davis in 1986 called technology adoption model (TAM). The model suggests that users' intention in accepting technology is primarily influenced by their perceived usefulness (PU) and perceived ease of use (PEOU) of the technology. According to TAM, if users perceive a technology as useful and easy to use, they are more likely to adopt it. Numerous studies have supported the validity and applicability of TAM in various contexts and technologies, such as e-commerce, social media, and mobile applications.

Another popular model, the Unified Theory of Acceptance and Use of Technology (UTAUT), was proposed by Venkatesh et al. in 2003. The concept integrates numerous factors that affects technology acceptance, including performance expectancy, effort expectancy, social influence, and facilitating conditions. It suggests behavioral of technology acceptance is decided by these constructs, as well as their level of experience and voluntariness of use.

Other theories and frameworks, such as the Innovation Diffusion Theory, Social Cognitive Theory (Bandura,2003), and the Diffusion of Innovation Model (Rogers, 2003), have also been applied to study technology acceptance. These theories provide valuable insights into the social, psychological, and contextual variables that affect acceptance and usage of technology. A couple of key Technology Acceptance theories are elaborated below for the purpose of understanding the general direction of academic research surrounding the topic and to get an idea of the classical theoretical context of technology adoption by its constructs to be able to analyze its gaps relative to the M-commerce use cases and for subsequently proposing possible extensions in the M-commerce context.

2.1 TAM / TAM2

The Technology Acceptance Models (TAM / TAM2) are commonly used conceptual frameworks that seek to elaborate technology acceptance (Al-Emran & Granić, 2021). Fred Davis, 1986 developed TAM and Venkatesh & Davis, 2000 extended the model to create TAM2, These models shed light on the elements that affect people's

intents to use and adopt technology, and how those intentions translate into actual technology usage. Some of the notable applications of TAM include studies on user acceptance of electronic health records (EHRs) (e.g., Holden, Karim, & Saldana, 2016), e-commerce websites (e.g., Liang, Huang, & Yeh, 2007), mobile payment apps (e.g., Lu, Yu, Liu, & Yao, 2003).

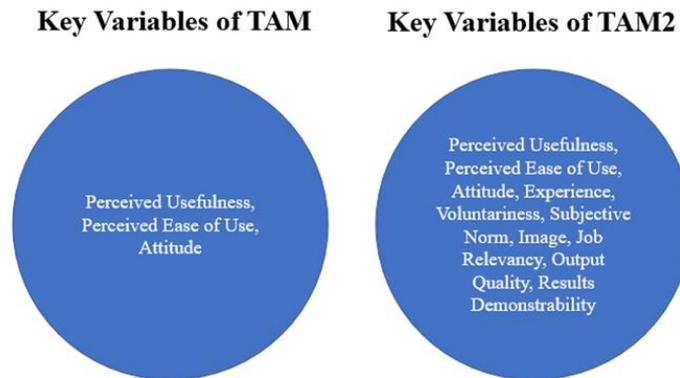


Figure 1: TAM/TAM2 Key Variables

2.2 UTAUT and UTAUT2

UTAUT and its successor UTAUT2 are theoretical frameworks that seek to explain and predict technology acceptance and use. These models were created by Venkatesh et al. in 2003 and 2012 respectively, by integrating various theories (Venkatesh et al., 2012). UTAUT and UTAUT2 provide insights into the constructs that affect acceptance and use of technology, and how those intentions translate into actual technology usage. UTAUT and UTAUT2 models integrate various technology adoption theories, such as the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Social Cognitive Theory (SCT), into a unified framework that explains user acceptance.

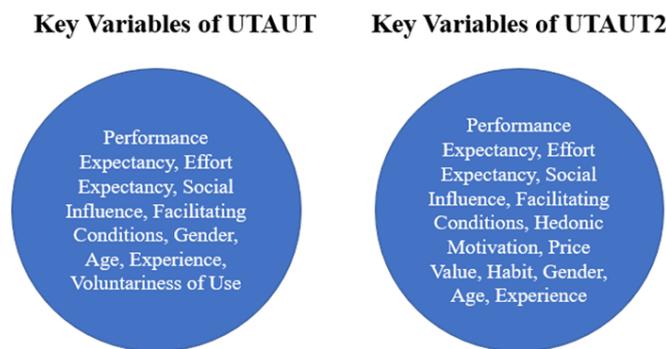


Figure 2: UTAUT/UTAUT2 Key Variables

III. Constructs that could extend the study of M-Commerce Acceptance

As summarized above, the theories of technology acceptance have matured over time with more constructs being identified and tested to describe general technology acceptance. In consideration of M-commerce, mobile device and mobile users' context, below are constructs discovered in literature to extend the classical theories of Technology Acceptance.

3.1 Utility Expectancy

There are numerous authors who talk about how acceptance could vary by technology, for instance (Van der Heijden, 2004) speaks about how different usage of Information Systems could mean different acceptance behaviours. Mobile devices nowadays are highly personalized and made for personal use, thereby the individuals experience in interacting with device becomes a more playful behaviour where the user enjoys the interaction

(Huang & Lin, 2023). This is quite different compared to the variable Performance Expectancy used in the classical acceptance theories and could be coined as Utility Expectancy that captures aspects related to playful joy and satisfaction influencing the quality of life where the individual may be at leisure.

3.2 Cost

Given that internet enabled smart phones are generally used for M-commerce application use and that the internet packages are usually private, the cost underlying M-commerce transactions are relatively higher in comparison to a classical E-commerce transaction. Therefore, cost is an important construct to be studied in M-commerce acceptance. Luarn & Lin, 2005 and (Wu & Wang, 2005) demonstrates how cost negatively influences the acceptance of M-commerce. The construct therefore could be studied as an extended aspect of Facilitating Conditions found in classical acceptance literature.

3.3 Trust

Trust is a construct that is commonly found in the marketing as well in E-commerce studies. Trust could be identified as the extent of positive attitude a technology user has towards utility (An et al., 2023). In the context of the traditional acceptance models, the focus is only on the positive attitude towards the technical solution itself, however there is more to this considering M-commerce given that the consumer would not only need to trust the technology but also the service providers and the underlying facilitating infrastructure including technical hardware and communication protocols, regulations and policy framework (Min et al., 2008).

3.4 Privacy

Mobile devices today are GPS enabled, where real time location of the user could be traced. While this has numerous benefits in service delivery including being able to personalize the service based on the location parameter (Eg: A mobile app that suggests nearby restaurants, fuel stations etc.) there is an inherent risk of the service providers knowing the location and the travel patterns of the consumers and this could very well be misused. Therefore, the Privacy construct is very closely related to the construct of Trust (Silva et al., 2023) ; where the consumers would be more likely to trust service providers that give them options and controls around the location-based services (Bhattacharjee, 2002).

3.5 Consumer Demographics

Research conducted by Okazaki, 2006 discovered that young single and wealth women were more likely to accept technology when compared to highly qualified working professionals. This is an aspect that would not be captured within the traditional models of technology acceptance and could very well be the reason for slow acceptance rates. Therefore, considering multiple of the user demographics factors in acceptance research is crucial. A combined factor of demographics where the gender, age, income level, career status and marital status could be combined may complement a M-commerce acceptance model (Min et al., 2008).

3.6 Culture

While technology may be generally understood as independent of culture, the growth of a M-commerce is most likely be impacted by the cultural differences across regions. For example, one of the factors that explains the explosive rate of iMode's spread is the distinct culture of Japan. No theory of IT adoption can account for such a phenomenon. The distinctive culture of Japan is one explanation that could apply. Researchers frequently include cultural elements in their studies on IT adoption (Qingfei, Shaobo and Gang, 2008). In a related study, Despite having comparable wireless connection hardware, Harris et al. (2005) found that m-commerce customers' views and behaviors in the UK and Hong Kong are very different. Numerous empirical investigations have demonstrated the direct and moderating influences of culture in the m-commerce acceptance context. It is therefore important to consider culture in m-commerce acceptance studies (Qingfei, Shaobo and Gang, 2008).

3.7 Habit

Based on study by Khechine, Raymond, and Lakhal (2020) on the specific part that habit plays in user technology acceptance, The findings indicated that a key factor in the explanation of technology acceptance is the habit construct. Habit has a big impact on intrinsic value, therefore encouraging users to adopt automatic behaviors may increase their enjoyment and interest in utilizing the required technology. Additionally, habit and the behavioral

intention construct had both direct and indirect correlations (Khechine, Raymond, and Lakhal 2020). These studies suggest that automatic behavior may both directly and indirectly, through intrinsic value, result in a stored intention to utilize the technology. The most of the research examined technology at the growing and mature stages of the product life cycle rather than the embryonic stage and believed people develop habits for using the product over time (Kuttimani, Nripendra, Dwivedi) (2019). Examples of this include looking at actual users' routine behavior when using Internet banking in Jordan (Alalwan, Dwivedi, Rana, Lal, & Williams, 2015). Ain, Kaur, and Waheed (2016) examined Malaysian students' regular usage of learning management systems, which had received little attention. 'Habit' was the antecedent for six dependent variables across 23 studies. In 18 investigations, the linkage among "habit" and "behavioral intention" (BI) was used to examine various aspects of TA. According to the findings of three researches, there is significance in each of the five links between 'habit' and its antecedents. Therefore, even in the context to M-Commerce Habit will have a prominent role to play when evaluating Users' behavior.

3.8 Affinity to Mobile Phones

Whereas "technology acceptance" describes how a user feels about a particular technology and is therefore situational as well as object-related, "technology affinity" describes how users exhibit their personalities, in this case through their usage of mobile phones (Henrich et al, 2022). As per Franke et al. (2019), technological affinity is defined by how people interact with technology, and it shows up in how actively people seek out or avoid using technology. Higher degrees of technology affinity are associated with acceptance of technology and a positive view on using it, say Jin and Divitini (2020). According to Güdel et al. (2020), technology affinity refers to a person's relationship with technology, which is influenced by, among other things, general attitudes regarding technologies. Technology knowledge and expertise are positively impacted by technology affinity. Additionally, according to Wong et al. (2020), it is crucial that technological affinity has a favorable impact on intent to use the technology. Thus, the intention to utilize a technology links technology adoption and technology affinity, two concepts that are strongly related.

A key element in the widespread use of M-commerce technology is the affinity for mobile devices. More and more people are using mobile devices for their purchasing needs due to the convenience that smartphones offer and their growing popularity. Businesses that prioritize mobile optimization and provide seamless mobile shopping experiences are better equipped to meet the needs of these mobile-first consumers and drive long-term success in the digital marketplace. To appeal to consumers with an affinity to mobile phones, businesses must prioritize mobile optimization and create intuitive, easy-to-use mobile interfaces. This includes ensuring fast loading times, simplifying the checkout process, and optimizing design for smaller screens. Additionally, businesses can leverage mobile technology to provide personalized product recommendations, offer exclusive deals and promotions, and provide seamless customer support through mobile apps and chatbots. Overall, the affinity to mobile phones is a key driver of M-commerce technology adoption. By prioritizing mobile optimization and providing seamless mobile shopping experiences, businesses can tap into the growing demand for mobile shopping and drive long-term success in the digital marketplace.

3.9 User Satisfaction

Studies have shown that factors like dependability of data and precision of systems are key in system design (Wixom & Todd, 2005). The two techniques can and should be combined, even though user happiness and technological acceptance have generally developed as parallel research streams (Goodhue 1988, Hartwick and Barki 1994, Melone 1990, Seddon 1997). A conceptual link between design and implementation choices, system properties, and usage forecast can be made with the aid of such integration. Finally, this would boost the practical usage of technological acceptance as well as the predictive value of user enjoyment. The expectancy-value theory, created by Ajzen and Fishbein in 1980, states that external factors influence perceptions about the results of a particular behaviour, that consequently shape the attitude on doing so. In turn, attitude affects the intention to engage in the activity, which in turn affects the behavior itself. What a person would regard to be content in a circumstance depends on their attitudes or feelings toward a variety of factors impacting that scenario (Wixom & Todd, 2005). According to the theory of reasoned action (TRA), when the attitude and belief factors are defined as consistent with the behavior to be explained in terms of time, target, and context, these relationships will be predictive of behavior (Ajzen and Fishbein, in press; Fazio and Olson 2003). These concepts have been given

embodiment in the IT literature as the TAM. TAM is frequently used to comprehend one's attitude toward using technology, that is utilized in forecasting the acceptance of technology. The TAM's attitude variable denotes a person's attitude toward using technology.

User satisfaction is crucial the successful adoption of M-commerce. As more and more businesses turn to mobile devices to reach their customers, it's becoming increasingly important to prioritize the user experience. Clients have a greater tendency to make repeat purchases, refer friends to the company, and become devoted brand advocates when they are happy with their mobile shopping experiences.

To ensure user satisfaction, businesses need to focus on creating mobile interfaces that are easy to use, intuitive, and responsive. This includes optimizing the design for smaller screens, providing fast loading times, and ensuring seamless payment and checkout processes. Additionally, businesses must prioritize data security to build trust with their customers and prevent potential data breaches. The success of M-commerce technology adoption depends on businesses' ability to provide a seamless and enjoyable shopping experience for their customers. By prioritizing user satisfaction and continually refining their mobile interfaces, businesses can stay ahead of the curve in the ever-evolving world of M-commerce.

3.10 Convenience (CN)

When the topic of convenience has been discussed, it is typically from the standpoint of usability (e.g., Okazaki & Mendez, 2013; Ozturk et al., 2015; Yoon & Kim, 2007). The literature on convenience has tried to modify the concept of convenience such that it is more formative than reflecting (see, for example, Brown, 1999; Berry, Seiders, & Grewal, 2002). According to research, CN is a variable that contains several different dimensions (Ozturk et al., 2016). The term "convenience" refers to a "person's desire for convenient products and services when it comes to user evaluations of service experiences". Time and effort savings are the two key factors that determine whether a product or service is useful (Berry, Seiders, & Grewel, 2002). When studying convenience, one or more of the dimensions from Berry, Seiders, and Grewal (2002) or Brown (1990) are typically utilized. Time, location, acquisition, use, and execution are these dimensions. The research results of To, Liao, and Lin (2007) showed that consumers' intention to shop was influenced by convenience. Convenience, according to Gupta and Kim (2006), had a favorable effect on consumers' intentions to shop online. Convenience has always been a factor in consumers' decision to utilize mobile commerce, as well as the apps they use it for (Chae & Kim, 2003; Kim, Mirusmonov, & Lee, 2010; Luarn & Lin, 2005). The concept of this CN is tightly linked to being flexible around location and time. The study on service marketing claims that CN relies on a number of factors, such as time and effort. Therefore, CN could be identified as a crucial variable in widespread acceptance of M-commerce technology. The ability to shop and make purchases on the go, anytime and anywhere, is one of the main reasons why mobile devices have become so popular among consumers. As such, businesses that offer convenient mobile shopping experiences are more likely to attract and retain customers.

To provide convenience in M-commerce, businesses must prioritize mobile optimization and streamline their purchasing processes. This includes providing easy access to product information, fast and secure payment options, and straightforward checkout procedures. Businesses can also use mobile technology to customize promotions and recommendations based on client individual preferences and past purchases. Overall, M-commerce technology adoption is driven by the convenience it offers to consumers. By prioritizing mobile optimization and creating seamless shopping experiences, businesses can tap into the growing demand for mobile shopping and drive long-term success in the digital marketplace.

3.11 Innovativeness

Various disciplines have distinct definitions of innovation (Amorosoa, Limb (2015). The degree of early acceptance of innovation is a term that is generally agreed upon among researchers (Agarwal, Prasad (1999). According to Rogers (1995), "innovativeness is the extent to which a person adopts innovation before others". Product-specific innovativeness, which fluctuates from product type to another, and life innovativeness, which refers to an innate propensity for innovation from a social and psychological perspective and includes sensory and cognitive traits, are the two types of consumer innovativeness, according to Kim and Park (2013). The personal innovativeness demonstrated a positive moderating effect on the association between the perceived relative

advantage, simplicity of use, compatibility, and the choice to embrace an innovation, according to a modified technology adoption model proposed by Agarwal and Prasad (1999).

Innovativeness is a key driver of M-commerce technology adoption, as consumers are always looking for new and exciting ways to shop and interact with businesses. Businesses may stand out from rivals, draw in new clients, and keep their current ones by adopting innovation. To stay ahead of the curve in M-commerce, businesses must continually innovate and experiment with new technologies and features. This can include incorporating virtual and augmented reality into their mobile shopping experiences, integrating chatbots and other AI-powered tools for customer support, and leveraging data analytics to provide personalized product recommendations and insights.

It is important to understand that innovation alone is insufficient in ensuring success in M-commerce. Businesses must also prioritize user satisfaction and convenience, as these factors are equally important in driving adoption and engagement. Ultimately, businesses that embrace innovativeness in M-commerce technology adoption are better equipped in meeting the constantly changing needs and preferences of their customers and stay competitive in the rapidly changing digital marketplace.

3.12 Deal Proneness

Deals are provided for the launch of new products to increase their appeal and lower the perceived adoption risks among consumers. Coupons, introductory discounts, premiums, rebates, and other deal incentives like these have a beneficial impact on customer reviews of purchases (Racela, 2015). Deal-prone customers are more likely to buy things when a second transitory "incentive" is added to the market offer. Deal-prone customers are sometimes characterized as frequent users, low-earners, price-sensitive, and disloyal to brands. These ideas are supported by certain study findings. For instance, while Lynn (2011) discovers that they are ardent consumers who like experimenting with different products, Price sensitivity is more common among deal-prone individuals, according to research by Hackleman and Duker from 1980. A consumer may contrast the features and performance of a new product with those of old items while deciding whether to embrace it. The evaluation of the new product may also involve contrasting its price of sale with that of competing items. Deal-seeking buyers would probably demonstrate lower interest in the "expensive" new product if it were introduced in a product sector that appeared to be commoditized but had very inventive new products that were far more expensive. Deal proneness therefore serves as a defense mechanism (Racela, 2015).

Deal proneness is a key variable in the M-commerce acceptance, as consumers are often attracted to mobile shopping for the potential savings and discounts that can be found online. Businesses that leverage deals and promotions in their mobile marketing strategies are more likely to attract price-sensitive customers and drive sales. To appeal to deal-prone consumers in M-commerce, businesses can offer exclusive discounts and promotions through mobile apps and email campaigns. Additionally, businesses can leverage data analytics to provide personalized deals and recommendations based on a customer's browsing and purchase history. However, it's important to note that while deal proneness can drive short-term sales, businesses must also prioritize user satisfaction and convenience to build long-term loyalty and engagement. Offering high-quality products and services, providing exceptional customer support, and optimizing the mobile shopping experience can all help to retain customers and foster positive brand associations.

Ultimately, by incorporating deals and promotions into their mobile marketing strategies while also prioritizing user satisfaction and convenience, businesses can leverage M-commerce technology to drive sales, build brand loyalty, and stay competitive in the digital marketplace.

IV. Conclusion

While the traditional models of technology acceptance has furthered the answers to acceptance questions to a good extent, there are technology specific behaviours amongst the technology consumers that needs to be looked at from the perspective of the specific technology. M-commerce consumers use mobile devices which have the unique characteristics of being ubiquitous, convenient and dependent on wireless networks where the consumers' experience of the M-commerce solutions are more personalized in nature and would be a different experience compared to that of E-commerce and other technologies. The constructs suggested herewith therefore are an excellent reference for M-commerce based businesses and academics that want to comprehensively study the

market for drivers of M-commerce acceptance and to solve retractors of acceptance. The models created with the said extensions could be empirically tested and validated and would add to the academia.

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