Listening to the Voice of the Consumer: Expanding Technology Acceptance Model for Online Transportation Context

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Abstract. *In business, every successful innovation must be followed with commercial success. Thus, consumer acceptance is essential for technological innovation to gain success commercially. In Indonesia, Mobile Online Transportation Service (MOTS) has become phenomena in recent years. They are blooming and creating a new business opportunity as consumer acceptance is arguably high. This phenomena lead us to our question if is there any variables compatible to be added to TAM to be used in today's context? As we know, TAM was developed in the eighties by Fred Davis, and this new mobile ICT base innovation did not exist yet. Using a literature review, this conceptual paper will compare the original TAM model with consumer review data gathered from MOTS application stores to answer our research question. As a result, we proposed an extended version of TAM.*

Keyword: *TAM, innovation, mobile online transportation, service quality, price, relative advantage*

1. Introduction

In business, all innovations must be followed by market success. Thus, customer acceptance is essential for technological innovation to gain success commercially (Herbig, & Day, 1992). Mobile online transportation service (MOTS) is a technological innovation that has become phenomena in recent years in Indonesia as it gains arguably massive acceptance from the public. Gojek is an example of a success story in introducing this kind of innovation. Since the Gojek mobile application launched in 2015, Gojek is reported to have about 15 million users and 900,000 drivers by December 2017 (Bohang, 2017). In Google Apps Store, Gojek Apps has been downloaded for 10 Million times with consumer rating 4.3 out of 5 (per March 2018).

From technology acceptance perspective, this phenomena also lead us to question the existing *Technology Acceptance Model* (TAM) especially on its ability to capture all existing variables in MOTS technology acceptance. We have three considerations on this topic. First,

as we all know, TAM was developed in the eighties by Fred Davis, and MOTS innovation did not exist yet. Second, TAM originally developed for assessing acceptance of information technology use in an organization context (Davis, 1989). As for today's condition, information and communication technology (ICT) that previously was typically only applied within an organization, it has reached outside an organization and become the backbone in e-commerce. Even now, ICT has spread more rapidly to create another business platform such as product-marketplace and service-marketplace like Gojek. Third, even though TAM was developed through empirical study with a consideration of competitive or commercial scenario, *price* factors were absent due to the technology tested was for office use.

The consumer was not required to pay certain amount of money to use the technology. This condition differed with today condition which ICT has been widely used outside the office and as a base for products or service by the application developer to gain consumer acceptance in the market. *Price* factor will be a

consideration for the consumer to consume the technology. This three consideration of environmental conditions leads us to our research question as follow.

> RQ: *Are there any variables compatible to be added on TAM to be used in a context outside an organization?*

We will answer this question by comparing the original TAM model with recorded consumer review from several MOTS Application. The importance of this study is to seek variables compatible to be added to the TAM model based on existing data. As a limitation, the present study might only appropriate to be applied in the MOTS context. To make it more general, further researches are needed using consumer reviews on other ICT-based mobile application. As for our comparative method between theory and consumer review data, we humbly consider it as our contribution of this paper to the research community.

2. Literature Study

We use a literature study approach with the specific approach of content analysis method. We are going to explore a particular issue based on available data on recorded human communication, in this case online consumer review. Nevertheless, we need a theory as our framework for doing research. Thus, we will use the *Technology Acceptance Model* (TAM) as our framework.

Technology Acceptance Model (TAM)
Technology Acceptance Model (TAM) was coined by Fred D. Davis in 1986, re-modelled by Davis, Bagozzi, and Warshaw at 1989, and establish the final model in 1996 as a result of collaboration with Venkatesh (Davis, 1985; Davis et al., 1989; Davis, & Venkatesh, 1996; Lai, 2017). This model consists of two main variables named as *perceived usefulness* and *perceived ease of use*. *Perceived usefulness* is defined as "the degree to which a person believes that using a particular system would enhance his or

her job performance." As for *perceived ease of use* is defined as "the degree to which a person believes that using a particular system would be free of effort." In this study, "usage is theorized to be influenced by perceived ease of use." (Davis, 1989, p.320).

Numbers of empirical studies have found about 40% variance in usage intention and behavior of the system was consistently explained by TAM. Further, "In 10 years, TAM has become well-established as a robust, powerful, and parsimonious model for predicting user acceptance" (Venkatesh, & Davis, 2000, p.187).

Davis (1989) conducts two studies. In those two studies, he uses two computer system for each of the studies. The *first study* consists of an electronic mail system and editing system as references. In this study, both systems are not being compared against each other. The study is aimed to investigate the *perceived usefulness* and *perceived ease of use* in user decision to system use which finally will be related to one's performance. In short, a system will be used if it can boost one's performance. Thus, we can assume that this model was focused on measuring single ICT product contribution or value to a person's performance through *perceived usefulness* and *perceived ease of use* as a determinant factor of *use*. In the study, he does however not compare different ICT products that has the same function.

This approach is understandable since, in an office context, the ICT-based product usually introduced in the mandatory setting. The top-down approach is more common. Employee as consumer usually will not have the privilege to make a comparison and choose between several ICT products to use in their office or organization. However, in the market situation, this scenario does not happen as the customer has many available products to choose. Davis test this marketing approach in his second study.

In the *second study*, "A lab study was performed to evaluate the six-item *usefulness* and *ease of use* scales resulting from scale refinement in Study 1." (Davis, 1989, p.330). Two ICT products are tested against each other as a new prototype system, named as Pendraw, is challenged to the existed system, named as Chart-Master. These two systems are build to perform the same task. The participants are then asked to predict their intentions in the future regarding the use of Pendraw and Chart-Master based on their relatively little experience with the systems. The overall regression result of the second study shows that the effect of *perceived usefulness* to *usage* was significant. Contrary, *perceived ease of use* has no significant effect on *usage* in both systems.

From the second study, marketing aspect has been used by Davis as he wrote: "Thus, a key marketing issue was the extent to which the new product would compete favorably with established brands, such as Chart-Master" (Davis, 1989, p.330). The purpose is to gain more insight on the contribution of relative little hands-on experience through less than one-hour system demonstration on *perceived usefulness* and *perceived ease of use* variable to *usage*. However, even though the study is made a comparison between existing and new ICT system and he also uses *Adoption of Innovation* theory as theoretical background of his study, Davis does not use the result to investigate the *relative advantage* variable to *usage*.

Davis does actually acknowledge the importance of *relative advantage* variable as he states:

> *Research on the adoption of innovations also suggests a prominent role for perceived ease of use. In their meta-analysis of the relationship between the characteristics of an innovation and its adoption, Tornatzky and Klein (1982) find that compatibility, relative advantage, and complexity have the most consistent significant relationships across a broad range of innovation types* (Davis, 1989, p.322).

In their paper, Tornatzky and Klein examine ten innovation characteristics and their relationship to innovation-adoption (Tornatzky, & Klein, 1982). However, Davis (1989) decides only take *complexity* to his model as it has similarity with *ease of use* variable. The reason might be as he writes in his paper: "As Tornatzky and Klein (1982) point out, however, *compatibility* and *relative advantage* have both been dealt with so broadly and inconsistently in the literature as to be difficult to interpret." (Davis, 1989, p.322).

Relative advantage is considered as one from several factors that important for consumer acceptance in the adoption of innovation (Herbig, & Day, 1992). Thus, this condition is an opportunity for us to re-introduce *relative advantage* to TAM and test whether or not the *relative advantage* affects the overall model. The discussion related to the *relative advantage* will be discussed further in the *Findings and Discussion* section.

Further, the *Technology Acceptance Model* has been undergoing development. TAM has been extended into TAM 2 to seek more understanding on determinants on *perceived usefulness* and *usage intention* variables (Venkatesh, & Davis, 2000). The TAM 2 is a result of a longitudinal study in a computer usage context using four system in the organization as test reference conducted by Venkatesh, & Davis (2000). Another effort to develop TAM is made by Venkatesh & Bala (2008) by creating a combination model of TAM2 with another model explaining determinants of *perceived ease of use*. TAM 3 model is the result of that study (Venkatesh, & Bala, 2008). However, this two attempts are not intended to add the TAM main variable. Instead, those studies tried to understand deeper on determinant factors of those two original TAM variables. Importantly, those two studies maintain previous workplace setting and goal of use-performance perspective leaving us the great opportunity to seek others possible variable which compatible to add in TAM central variable from outside workplace settings.
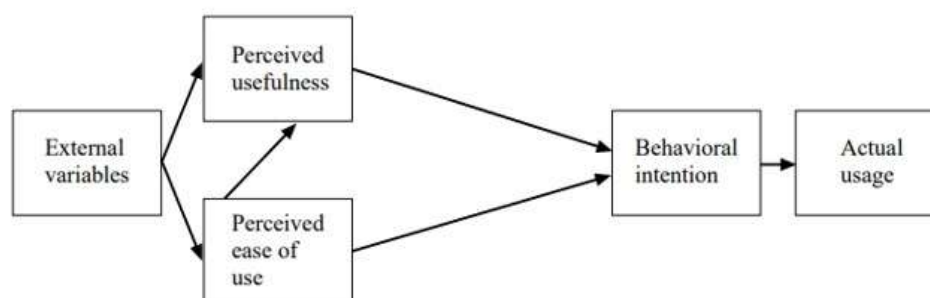
Figure 1.
Technology Acceptance Model, Source: Davis and Venkatesh (1996)

Therefore, we will use the original TAM depicted in Figure 1 as model base for this paper because there is no main variable added in TAM2 and TAM3 which makes the original version of TAM is still relevant.

Consumer review on Mobile Online Transportation Service (MOTS)
MOTS is well known as an online taxi. Ojek Online is an Indonesian service type of two- or four-wheeler online taxi. However, in the development, their service was extended not only in the transportation sector but also in food delivery service and logistic. This new kind of transportation service introduced recently in Indonesia. For example, Gojek was launch in 2015. It is an Indonesian online transportation provider. Other well-known providers are Grab and Uber.

In today's mobile digital world, application store such as Google's Play Store and the Apple Store becomes information sources regarding customer reviews of a certain product/service. This application store also provides information on previous consumers experience on certain application with their rating. This information can be used as our information about the consumers. Thus, the consumer reviews documented in the Google Play Store can openly be accessed by the public as a source of information. The documented information is also used as the secondary data of this study. As being known, consumer review has been widely known as one of the data sources of study, especially related to the customer expectation (marketing) studies.

3. Methodology

To answer our research question, we are going to conduct a literature study to develop our theoretical framewok. From the ICT perspective we are going to learn consumer acceptance using the framework of the *Technology Acceptance Model.*

Then we are going to study consumer review using information provided by Google's Play Store review highlights. Next, we compare variables suggested by the Play Store with the ones of TAM. The aim is to seek for variables that reasonably suggestible to be added to the TAM.

As previously mentioned, content analysis is also used in this study. In past, content analysis is majorly only used in the quantitative study. According to Bengtsson (2016), content analysis however can also be used both in quantitative and qualitative methodology. For example, content analysis is recently also used as qualitative research method in health research and has been gaining popularity (Hsieh, & Shannon, 2005). This approach is known as Qualitative Content Analysis. This analysis is used to analyse text data using systematic classification process of coding and themes or pattern identification resulting

subjective content interpretation (Hsieh, & Shannon, 2005).

To perform content analysis, we can use either manual content analysis or text mining. Manual content analysis is chosen when coders seek semantic entities and not seek for syntactic entities (Pagano, & Maalej, 2013). Manual content analysis aims to understand the true meaning of words given in feedbacks. For example, feedback sentence might describes a sarcasm or irony, e.g., *I lost all my phone contacts. Great, thank you!* Also, when using manual content analysis, coders could also assign certain topic such as "Praise" for several feedback such as "cool", "great", or "awesome" (Pagano, & Maalej, 2013). Thus, in their study, Pagano & Maalej use manual coding rather than text mining process. In this study, we will use qualitative content analysis with secondary data that has been undergoing text-mining content analysis process.

4.   Findings and Discussion

From consumer reviews highlight on Mobile Online Transportation Service Application, we can see consumer consideration when rating mobile transportation application at Table 1. From this information, we cluster those words into categories. Then we sort this

category from the most to the fewest. The result can be seen in Table 2.

After comparing with existing TAM models, we have three potential variables to be added to the model. Those three variables are *service quality*, *price value*, and *innovativeness* (see Table 3). In total, the quality of service has been the most prominent consumer concern. The importance of *service quality* for MOTS consumer can be seen especially on Uber applications (see Table 1 & 2). As for Gojek and Grab, the quality of service aspect is ranked third. This finding is interesting because Uber has an international market base while the business area of Grab and Gojek is more limited because it only operate in the ASEAN market. Even, Gojek is only operating in the Indonesia market (Waruwu, & Adhiutama, 2017). However, recently, Gojek has expanded their operation in the ASEAN market.

The differences in consumer perceptions of the *service quality* between these three applicators can be explored in future research. *Price value* is also a potential variable to be added to the TAM based on our comparative results on consumer reviews. This effort also has been done by Venkatesh when developing UTAUT-2 as technology no longer limited to office context and can be consumed by the public with a certain cost.

Table 1.
Consumer Review Highlights

Review	Gojek	Grab	Uber
Helpful	4,395	4,562	
Easy to use	1,024	2,388	4,418
Good service	760	1,831	14,369
Brilliant idea	128		
Cheap price	77		
Great innovation	38		
Affordable price		157	
Freeride		73	1,043
Bad experience		73	1,012
Useful			7,791
Nice car			517

Table 2.
Categories of Consumer Review Highlights

No	Category	Review Highlights	Total Reviews
1	*Service Quality*	"good service", "nice car", "bad experience."	18.562
2	*Usefulness*	"helpful" and "useful."	16.748
3	*Easy to use*	"easy to use"	7.830
4	*Price Value*	"affordable price", "free ride", and "cheap price."	1.350
5	*Innovativeness*	"brilliant idea" and "great innovation."	166

Table 3.
Variables comparison of TAM (Davis, & Venkatesh, 1996) *and MOTS Consumer Reviews*

No	Category	TAM	MOTS
1	*Service Quality*	No	Yes
2	*Usefulness*	Yes	Yes
3	*Easy to use*	Yes	Yes
4	*Price Value*	No	Yes
5	*Innovativeness*	No	Yes

However, we decide to exclude *innovativeness* because it has few review numbers compare to others. After getting two potential variables to add to TAM, we will discuss each of these variables in the next paragraph.

Service Quality
The existence of *service quality* is interesting because most existing acceptance models such as TAM and UTAUT do not include *service quality* as their independent variables. Nevertheless, there is a previous study showing that *service quality* has a significant correlation with the use of an online transportation service (Waruwu, & Adhiutama, 2017). Empirical data from consumer review also shows that *service quality* has become a concern in consumer rating. Surprisingly, *service quality* outperforms *perceived usefulness* and *perceived ease-of-use* in the total number of consumer reviews. However, again, we have to pay attention to the difference in importance level of *service quality* for consumer between Uber and other MOTS applications (Grab and Gojek) regarding where they operate their business. The only

known model that uses *service quality* variable is the DeLone and McLean *Information System Success Model* (DeLone & McLean, 1992). They define *service quality* as overall support from the service provider to the users. They implies that *service quality* become important as user now become customers. Support for information system user can be delivered either by the service provider themselves, a new dedicated unit, or third-party. According to DeLone and McLean, *service quality* is important for information system success as poor user support will lead to lost customers and sales (DeLone, & Mclean, 2003).

However, we might have to dig deeper to understand the characteristic of *service quality* in the ISSM and MOTS consumer review. Does it has the same meaning or scope between *service quality* variable in ISSM and MOTS consumer reviews? To further study this variable we also have to compare it with *ServQual* (Parasuraman, Zeithaml, & Berry, 1988) and *E-S-Qual* (Parasuraman, Zeithaml, & Malhotra, 2005) variable as these are the well-known theories as a base for this topic.

For our perspective, finding on *service quality* variable in technology acceptance is in line with other paper on *Product-Service System* (PSS) topic such as conducted by Amalia and Aprianingsih (2017). The emergence of high technology and globalization makes tangible asset not enough to gain a competitive advantage. Thus, they must combine tangible asset they have with intangible asset. "In other words, basically in PSS the product and services are integrated to meet consumer's final need." (Amalia, & Aprianingsih, 2017, p.21). There is a shift in the business paradigm from product oriented to become consumer solution provider (Yuliandra, Sutanto, & Hadiguna, 2013).

In PSS there are three main combinations among product and service, i.e., *Product-oriented services, Use-oriented services, and Result-oriented services*. From the first to the last type of these product and service combinations, the importance of a product as main component decrease and consumer needs become more abstract (Tukker, 2004).

Product-oriented service business still depends on product sales. However, along with the product, providers also offer services as added value for their products. These value added services delivered in form of *Product-related service* in form of services needed by consumer when they use the product (e.g., a maintenance contract, financing scheme, and take-back agreement); or *Advice and consultancy* in form of advice on how to use the product in the most efficient way (e.g. advice on the team using the product)

In other hand, *use-oriented service* business model do not produce profit from selling products. Instead, providers keep the ownership of the products and made it available for their consumer. In this model, providers sell the product's function to the consumer and not the ownership of the product. Consumer then use it to fulfil their needs in certain period. Types of *Use-oriented service* business model are *Product lease*, *Product renting or sharing,* and *Product pooling*.

Similar with *use-oriented service,* providers of the *result-oriented service* business model also keep the ownership of the product. However, in this model consumer does not consume the products function by lease it. Instead, they consume the outcome or performance of the provider. Thus, this model is rely more on service content instead to the product. Three types of this business model are *Activity management/Outsourcing, Pay per service unit,* and *Functional result* (Tukker, 2004).

From our perspective, Gojek or other ride-sharing platform are considered as *use-oriented service*. In this type of PSS, "the product stays in ownership with the provider, and is made available in a different form, and sometimes shared by some users." (Tukker, 2004, p.248).

However, MOTS itself has slightly differed business model with existing *use-oriented service* in PSS model. In Gojek business model, for example, motorcycles and cars as core assets are not owned by company or provider. Instead, these products are owned by company business partners who in this case are Gojek drivers. This strategy makes Gojek able to provide numerous services to fulfill their consumer needs in a relatively short time with less capital investment needed to provide core product or service in the transportation business. Thus, in our point of view, this business model can be considered as an innovation seen from PSS point of view.

Service has been dominate economy and everyday life. Even companies that sell a product also offer services (Bettencourt, 2010). Thus, developing this kind of business must align both tangible and intangible aspects, combining and balancing between ICT product and service quality.

H1. *Service Quality will have a positive relationship with the Intention to use.*

Price Value
Other interesting variable emerge in this study is *price value*. TAM also does not incorporate this variable to this day. However, the *price*

value is one of the important aspects of consumer acceptance of innovation or technology. There are three factors that play a role when individuals adopt an innovation at the first time: individual characteristics, product requirements, and ability to pay (Herbig, & Day, 1992). UTAUT-2 acceptance model already incorporates price in it. As a brief historical background, the UTAUT-2 model was developed from the UTAUT model in 2012. UTAUT model was build based on eight previous individual model (Venkatesh, Morris, Davis, & Davis, 2003). In this recent model, three more variables were introduced such as *hedonic motivation*, *price value*, and *habit*. they also drop the *voluntariness of use* from moderating variables. This model was introduced to measure technology introduction commercially (Venkatesh, Thong, & Xu, 2012).

UTAUT-2 shows us that *price* have a relationship to consumer acceptance as ICT now become a commercial product. ".., our study suggests that perceived benefits over monetary sacrifice (i.e., the price value) of IT applications can influence consumers' technology use." (Venkatesh et al., 2012, p.173).

However, this extended model developed within the context of the cost being given to access and use the ICT service (i.e., internet service access price). This condition differs from today's context as an information system and technology has been used outside the workplace, and a certain amount of cost is needed to use the product or service. For example, in MOTS, other potential pricing might emerge beside the cost for the internet access. Another aspect of price competition among providers such as promotion or discount is absent in this context.
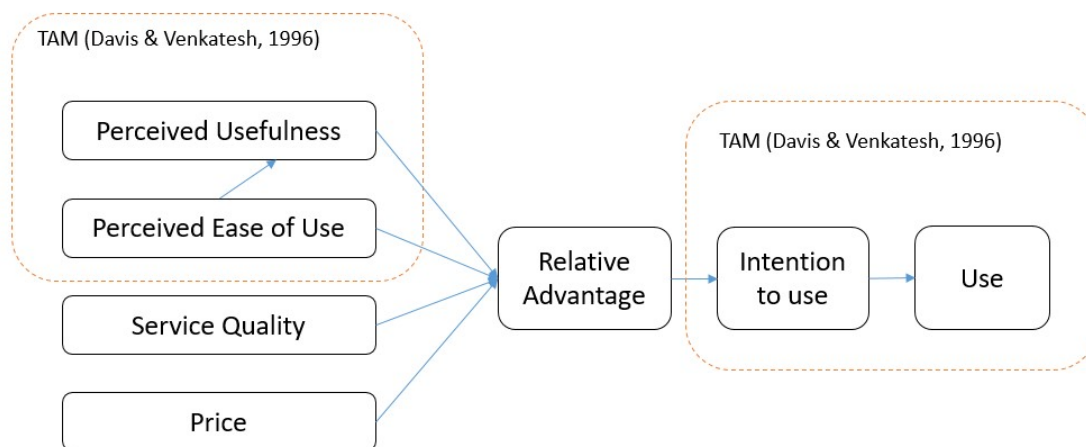

Figure 2.
The Proposed Conceptual Model

H2. *Price Value will have a positive relationship with Intention to use.*

Re-introduce the Relative Advantage
Studying this topic leads us back to the history of TAM itself. As we compare TAM with Herbig and Day (1992), we realize that there is one variable that was not used back then but might appropriate to be added to the model in today's competition context, named *relative advantage*. The *relative advantage* itself came from Rogers *Diffusion of Innovation* theory (Rogers, 1983). As for definition, *relative advantage* was defined by Rogers (1983) as "the degree to which an innovation is perceived as being better than its precursor" (p.15).

Relative advantage is not included as an independent variable in the most technology acceptance model. For example, TAM only uses *perceived of useful* and *perceived of ease of use* as their independent variables in their model. DeLone and McLean only incorporate *system quality*, *information quality*, and *service quality* in their model. In the UTAUT model, *Diffusion of Innovation* theory from Rogers has been studied and synthesized in one variable when Venkatesh et al. (2003) develop the first UTAUT model in 2003. In this model, *relative advantage* was clustered in *performance expectancy* variable. However, in his work, Venkatesh refers *relative advantage* variable to the work of Moore and Benbasat (1991) with acknowledgment of Rogers (1983) work.

Nowadays, ICT is not only used in internal organization or workplace. However, it has also been used as a collaborative platform for economic use to reach individual end-users. ICT has become the backbone of service and product innovation. Based on this understanding, competition among provider becomes salient and comparative judgment from the consumer is unavoidable.

This new market ecosystem was not considered when the previous technology acceptance model was developed. TAM, UTAUT, and ISSM are developed originally to model the acceptance of technology which is introduced in a workplace context. Thus in those studies, users are typically not be considered as a commercial consumer that have bargain power and consideration on other products or services available in the market.

As previously mentioned, technology has also been exploited as the backbone of online marketplace business. Comparative judgment from the consumer is unavoidable. This does not mean that certain technology was not adopted because it was not useful nor helpful. However, it is plausible that consumer meets other technology that has a *relative advantage* rather than offered product or service (Wang, Meister, & Wang, 2008).

A study conducted by Wang, Meister, & Wang (2011) concluded that *relative advantage* and *perceived usefulness* do have relation, but they are not the same variable. In their research, the *relative advantage* fully mediates the existing technology with the *intention to use* and partially mediating the new technology with the *intention to use*. Wang et al. (2008) argue that *relative advantage* should not be treated as identical to *perceived usefulness* when researcher try to explain and predict the ICT adoption, especially in the context when alternative ICT are available. It is because an ICT could be perceived as very useful but users still not adopted it.

Our understanding based on the results of this study, not only we have to consider to pull out the *relative advantage* from *perceived usefulness*, but we also must redesign the existing technology acceptance model by making *relative advantage* as mediating variable between *perceived usefulness* and *intention to use*. Thus, we propose that we should exclude *relative advantage* from performance expectancy, adding it as a moderating variable for the TAM and then testing its contribution. We base our judgement on Wang et al. (2011) study and Rogers' (1983) statement implies that economic terms, social prestige factors, convenience, and satisfaction are important components to measure the degree

of *Relative Advantage*. Further, Rogers (1983) wrote:

> *It does not matter so much whether an innovation has a great deal of "objective" advantage. What does matter is whether an individual perceives the innovation as advantageous? The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption is going to be.* (Rogers, 1983, p.15)

In addition to demonstrating the importance of *relative advantage*, Rogers' statement above also points to the importance of *service quality*, *pricing*, and *ease of use* in technology adoption as satisfaction, economic terms and convenience are some of the key components that make up the *relative advantage* felt by users. Thus, consumer perspective of *perceived usefulness*, *ease of use*, *service quality*, or *price* might shape their judgment toward *relative advantage* on certain product or service which has a relationship to their *intention-to-use* and *use*.

In short, we argue that *relative advantage* is an important variable that needs to be added in TAM when this model is used to study the acceptance of a technology base product or service in a commercial setting. Also, if it is true that consumers do not consider the *relative advantage* of a product or service, then why we should bother to consider the *competitive advantage* in our business processes? As we have known that the concept of *competitive advantage* and *relative advantage* have the same meaning. The first variable is generally used from the perspective of consumer, the second one is used from the perspective of producer (c.f., Porter, 1985; Roger, 1983).

Based on the perspectives mentioned above, this study proposes the following hypotheses:
H3.1 Relative advantage will have a mediating role between perceived usefulness and intention to use.
H3.2 Relative advantage will have a mediating role between perceived ease of use and intention to use.
H3.3 Relative advantage will have a mediating role between service quality and intention to use.
H3.4 Relative advantage will have a mediating role between price value and intention to use.

5. Conclusions

From this study, we can conclude that there are three potential variables compatible to be added to TAM. Those potential variables are *service quality*, *price value*, and *relative advantage*. Comparing TAM theory to the collected data from the MOTS consumer reviews, we propose to add *service quality* and *price value* to the model as independent variables. Also, learning from TAM history and previous research on the relative advantage, we propose to exclude *relative advantage* from the *performance expectancy* and add it as mediating variable on TAM.

The current study does not nevertheless empirically test the proposed model. Thus, this may arguably become the limitation of this study. However, this might open opportunity for other scholars to join in and contribute by re-examining or testing the idea of this study and see how far these variables may be incorporated to the model. Other research could also be done for example to explore consumer review using manual content analysis to gain deeper insight into service quality and price value characteristics in MOTS.

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