Exploring of Factors Related to the Technology Adoption in Purchasing System of Product Through Mobile Application

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Abstract: The digital world has been disrupting many conventional methods, especially the purchasing system. The smartphone is also becoming more addictive today. This study explores the factors related to the people reaction and learning process of technology adoption in terms of using the application on a smartphone as the purchasing canal. The qualitative analysis, including an in-depth interview with an expert, tech-savvy people, and another related person to the research question, is used to find the factors related to adopting the technology. The company reputation, promotion in terms of price-reducing and design of User Interface (UI), and easy User Experience (UX) are the factors related to the technology adoption. The qualitative method will become basic questions for a quantitative method using a questionnaire and validate the results with the unified theory of acceptance and the use of technology. The promotion has become the most influential factor based on our research to gain awareness or reaction until peoples are driven to learn the technology and decides to purchase. The price value has a relation to the behavioural intention that ended with the use of behavioural as a final step. The finding result will be used to jump the chasm between the early adopters and the early majority on the technology adoption life cycle. Due to the small number of early adopters on market shares, the early majority becomes important segmentation to gain bigger market shares and become a market leader. The finding factors will also use for the marketing strategy for future penetration and customer acquisition, especially new start-ups, where their products/services are based on mobile applications. This study has not yet explored the strategy related to the company's operation and financial aspect in terms of using the finding factors for the customer acquisition process.

Keywords: Technology adoption, mobile applications, smartphone, purchasing system

INTRODUCTION

Mobile application is positive tools for companies in order to introducing and selling the product especially in this century, where people have high dependency on smartphone, due to the characteristics of smartphone that be able to access a variety of things through the power of mobile application such as social media, games, music, chat, e-money and even for shopping purpose. To use a smartphone or application as a tool in business activity, a company must have great consideration because there is a gap between those who have the readiness to adopt technology and those who are not at all ready for innovation or change. Based on the study conducted by Moore (2014), there are five segments that have different responses to the technology adoption process (see Figure 1). Innovators and early adopters are two segments that have a rapid response in adopting the technology and learning processes. While the

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early and late majority segmentation does not have the same ability or interest with innovators or early adopters in seeing a new product with technology or innovation. A company that wants to use technology specifically to create efficiency and competitiveness, they are faced with this gap and are required to be able to pass through the chasm in order to reach a broad market share. There are certain factors to succeed in jumping the chasm and making the majority of the segmentation succeed in adopting these changes or technology. This study will focus on exploring the factors that play an important role in the technology adoption process, especially for majority segmentation and creating a process or pattern that is useful to be able to find out the majority segmentation behavior in the process of technology adoption.
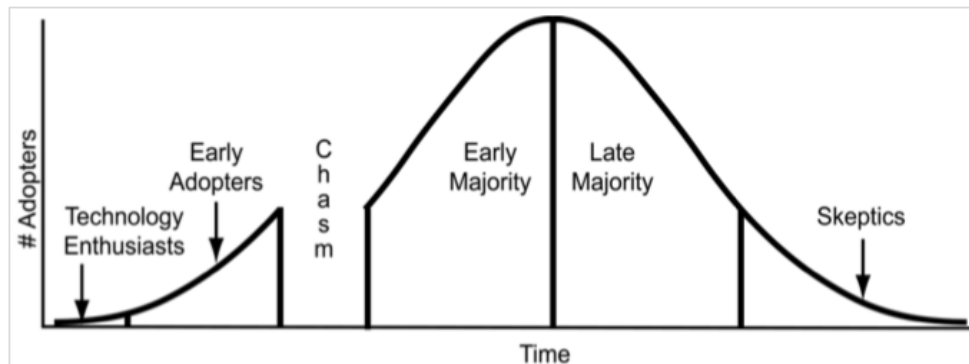

Figure 1 *Technology Adoption Lifecycle*

To understand the technology adoption process, a theory described by (Rogers, 2003) in the Diffusion of Innovation Theory, there are several stages in the adoption process, wherein the third stage, namely determining the decision, there are two options such as adopting or rejecting the change (see Figure 2). In the context of the rejection of a change, a theory put forward by (Kotter & Schlesinger, 1979; Thanyasunthornsakun, Sornsakda, & Boonmee, 2016) states that one of the reasons, why people reject a change is because of misunderstanding or misinformation about the implication of change. Hence it can be concluded that an adoption decision can occur, if what is feared by certain segmentation will not occur and all their needs will be fulfilled.
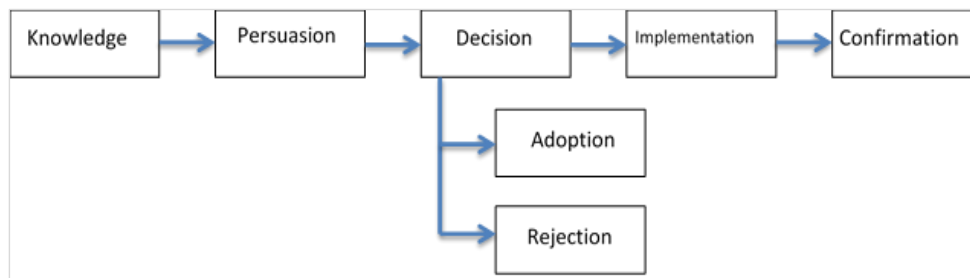

Figure 2 *Stages in the Decision Innovation Process*

The process of adoption above will determine the implementation of the findings of factors that can affect someone in adopting the technology.

METHOD AND MATERIALS

This study uses a combination of qualitative and quantitative research. In the process of qualitative research, we conducted six interview sessions with professionals, who had experience as application developers as well as general views of people who were related in this study based on segmentation and habits. In an interview, a professional believes that an application can be classified as something new for some consumer segments, especially in Indonesia. For some segmentation, a stimulus is needed so that the adoption process and technology learning can be carried out by the intended segmentation. Based on the opinion of a study conducted by Moore (2014), as in Figure 1, each individual is divided into five segments or social structures. Segmentation, among others, has different characteristics. In terms of technology adoption, generations of innovators and early adopters are the social groups that have the fastest response in the technology adoption process. However, their population in the market share only has a maximum amount of 16% compared to early, and late majority segmentation whose total market share reached 68% (Richardson, Kelley, & James, 2015). From this information, it can be concluded that technology adoption for the majority of segmentation

can help companies grow and get optimal revenue because of the large market share. In addition, early adopters and innovators can be regarded as radical adopters who the majority are admirers of technology, but still have limitations such as speed in the process of adoption (Martinez, 2012).

Based on opinion from the interviews with experts regarding the application, the factors that play an important role in being able to make applications can be adopted by late and the early majority are divided into two perspectives namely internal and external. The internal factor is the technology itself, which must provide more value and convenience. In addition, speaking of technology in this study, which is applications as a purchasing channel, there is an important component that must be considered in an application. These components are UI and UUX design. An application that does not meet the UI and UX aspects based on human behavior will have difficulties to be adopted by humans. The external factors include aspects of consumers, such as readiness in accepting change.

According to research conducted by Alvar (2011) on technology adoption of the decision framework, it is stated that the technology adoption process is very dependent on the aspects of an organization, culture, and technology in the company's internal and external, which will help the technology adoption process take place well. The organization acts as like a function in carrying out the duties and work of the company. In addition, culture acts as a value that makes a company have a positive identity. Then the technological aspect becomes the most important thing where established technology will make the technology adoption process runs well, for example where technology that still has some technical issues will reduce the enthusiasm of the technology users themselves. After the internal process can be optimized, the analysis of competitors as the external analysis is also a very important factor. In the other interview, we got several other factors that have important roles in technology adoption, especially in the consumer or external perspective. In the interview results, factors such as discounts are one of the stimuli that can make consumers open themselves to be able to carry out the learning process of technology, especially in the use of applications as a purchasing channel. Basically, discounts are a stimulus that can help consumers meet their priorities to get the price they want. Based on the results of the study, 31% of consumers in Great Britain never pay for an item at full price (Skeldon, 2011). The same interest and opinion about price value apply for consumers in Indonesia as well.

The next interview process provides information regarding the role of UI and UX in adopting the use of applications as a purchasing channel. Based on the opinion of an expert, a UI will provide a user interest in the application, such as an example where the application is aimed at segmentation between women with an age range of 20 to 25 years old, then the application will provide an appropriate display of color aspects, graphic design, layout, and the most important thing is that the content will be adjusted to the target market so that the adoption process until the adaptation to use the application for segmentation will run easily. The first impression on the interface of the application will also be important. The first impression creates either a positive or negative feeling that also impacted on the future perception (Bridger, 2017). In addition, UX plays a very vital role in the adoption of application technology as a purchasing canal. UX is a process that occurs in an application that includes the exploration process until the transaction process takes place. A process that is fast and spends a little time in the transaction process will create a positive experience in using the application. So the role of UI and UX is very important in order to help prospective users have the desire and interest in using and through the learning process and habituation in using technology. In the last interview, other internal roles that influence the adoption process are trust that includes the company's reputation and its brand image in the social environment. This factor has also been conveyed in a study of the Mobile Service Acceptance Model (MSAM), where trust is a factor that can encourage someone to have the Intention to Adopt (IA) an application in a smartphone for various activities, especially the purchase of a product (Gao, Krogstie, & Gransather, 2008).

After going through a process of exploring factors related to technology adoption with experts and professionals in the field of information technology, the research continues by conducting interviews with three people with different backgrounds and characters adapted to segmentation in the technology adoption lifecycle (see Figure 1). These three people are categorized as early adopters, early majority, and late majority. The characteristics of all segmentations describe below in order to understand their behavior.

- Early Adopters: are a group of generations that have very dominant characteristics, namely speed in facing technological changes and the technology learning process, making them one of the fastest groups in adopting the technology (Richardson et al., 2015). This adoption process takes place naturally, which is also caused by their characters that like technology. In addition, this generation has an influence on other generations of the technology adoption process (Rogers, 2003).
- Early Majority: this generation has a passion that is almost the same as early adopters towards innovation and

technology. However, this generation has a difference in speed for adopting technology. Early Majority has a tendency to hold back and wait for the right time to do the adaptation process. In addition, this generation tends to have personalities that are not easily affected by the opinions of others (Rogers, 2003).

- Late Majority: in the process of adopting the technology, late majority is skeptical of some changes they do not really need. This generation needs special encouragement to be able to adopt technology as an example if in conditions where there is no other choice and if most or all people in the social environment have adopted these changes (Rogers, 2003).

In results of the exploration of factors through interviews, it produces an adoption pattern and reasons for various segments.
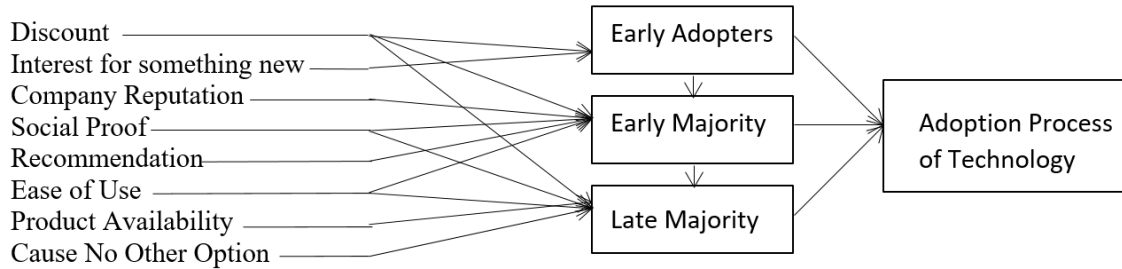

Figure 3 *Factors Related to Technology Adoption*

In addition, there are generations of Innovators and Laggards, but in this case, these generations do not have a sufficiently deep role due to a very small population or size in market share.

From these results, it can be concluded that there are four main categories, namely promotion role, technical application (in this case UI and UX) which has the role to be able to make applications interesting and easy to use (ease of use), corporate reputation that can have an impact social proof and recommendations. There are also supporting factors such as product availability and personal reasons. Broadly speaking, in the research process with qualitative and quantitative approach methods, the factors that influence the technology adoption process are a promotion, UI/UX design, and the company's reputation. Furthermore, the results of qualitative data serve as the basis for questions using questionnaire targeted to 100 respondents. The questionnaire was made to validate these three factors as factors that play a role in technology adoption. Below is a profile of respondents who were selected as generation representatives and very dependent on technology.

Table 1 *PROFILE OF RESPONDENTS*

Gender of Responses	Male	30.2%
	Female	69.8%
Domicile	Jabodetabek	24.5%
	Java Island	70.8%
	Outside Java Island	4.7%
Ages of Respondents	20-30	79.2%
	30-40	18%
	> 40	2.8%
Spending time on smartphone	< 2 hours	8.9%
	2 until 5 hours	49.5%
	> 5 hours	41.6%

The profile of respondents was chosen randomly with a focus on generations that represent the early adopters and the majority in the lifecycle adoption scheme of technology from (Rogers, 2003). In addition, the focus of this study was only on three regions in Indonesia, namely Java Island, a special area of the capital city and surrounding areas and a small portion of other regions in Indonesia. This domicile of respondents will be important because of the character of the people in the region who mostly understand the development and knowledge related to the world of technology. And finally, in this study, a question was asked about the intensity of respondents in using a smartphone in one day.

The questionnaire got 106 responses with the age range between 20 until 45 years old. About 16% of them are 28 years old, and 15% responses are 26 years old. According to the profile of respondents, 49.5% of respondents on this study spending two until five hours to use a mobile phone or smartphone in one day. 41.6% of respondents spend more than five hours and only 8.9% of respondents spend less than two hours to use a mobile phone. To validate and deepen the result on an interview about factor related to technology adoption, in total 106 respondents have been asked. 5 respondents answered never and did not want to try to buy products through the application, hence totally 101 respondents were relevant. The data result be processed with IBM SPSS Statistic to prove the validity and reliability

Table 2 *DESCRIPTION OF VARIABLE*

Variable	Description
X1	The impact of discounts on the adoption of new technology-based products.
X2	The role of applications interfaces (UI) such as color, layout, and ease of process in using the application (UX) to make transactions of product.
X3	The role of the company's reputation in the process of making the decision to make transactions through the mobile application for the first time.

Table 3 *SUMMARY OF VALIDITY TEST RESULTS*

Variable	R Count	R Table	Sig Value	Validity
X1	0.739	0.195	0.000	Valid
X2	0.809	0.195	0.000	Valid
X3	0.714	0.195	0.000	Valid

R Table (101 respondent, Sig 5%, 2-tailed)
df : N-2 = 99
R Table : 0.195

From the Table above, it can be explained that the value of r count > r table is based on a significant test of 5% or 0.05. It also means that the factor X1, X2 and X3 above are valid.

Next, the result will be tested for reliability using the same IBM SPSS. The result of the reliability test can be seen in Table 5 and Table 6 below.

The result is reliable because Cronbach's Alpha Based on Standardized Items has 0.622 meanwhile the minimum of Cronbach Alpha 0.619. It also described that the 3rd statement is reliable.

RESULTS

Previously, the author had delivered the results of the study through in-depth interview methods with experts and prospective consumers as an interviewee. In the interview, we found three main factors that could influence someone to be able to adopt technology based on three consumer segments (see Figure 3) These factors include discounts, UI and UX design, and company reputation. Then from these results, the study continued with a quantitative method, which examined the role of the three factors that the author found in general, which had been categorized before on three segments, namely early adopters, early majority, and late majority.

From the results of the questionnaire, 73% answer that discounts have an important role in stimulating the adoption process and technology learning process. In addition, the design of UI and UX on application plays an important role in the context to make the application look attractive and easy to use. There are 89.1% of respondents answered that the role of UI and UX could greatly influence them to be able to accept and process new technology learning. Finally, 91.1% of respondents answered that the reputation of the company where the company is an application provider has an important role.

As the last question, we want to know from these three factors which factors have the greatest role. These three

Table 4 *DATA VALIDATION RESULT*

		Correlations			
		X1	X2	X3	SUMX
X1	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	101			
X2	Pearson Correlation	.385**	1		
	Sig. (2-tailed)	.000			
	N	101	101		
X3	Pearson Correlation	.230*	.449**	1	
	Sig. (2-tailed)	.021	.000		
	N	101	101	101	
SUMX	Pearson Correlation	.739**	.809**	.714**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	101	101	101	101

**. Correlation is significant at the 1% (0.01) level (2-tailed).
*. Correlation is significant at the 5% (0.05) level (2-tailed).

Table 5 *CASE PROCESSING SUMMARY*

		N	%
Cases	Valid	101	100.0
	Excluded[a]	0	.0
	Total	101	100.0

Table 6 *DATA RELIABILITY RESULT*

	Reliability Statistics	
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.619	.622	3

factors have the same tendency of weight, where 37.6% of respondents think that discounts are very influential, while the company's reputation gets a percentage of 34.7% and UI/UX design of 27.7%.

Based on the findings of the factors in the research process, there are also the results from the previous study of technology adoption such as the Technology Acceptance Model (TAM) and also MSAM as mentioned before. TAM is a theory that provides a pattern of technology adoption where Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are the determining factors and play an important role in the process of forming human behavior in the process of accepting a technology-based change (Davis, Bagozzi, & Warshaw, 1989). The TAM explains that PEOU and PU have strong correlation with technology adoption (see appendix 1 and 2). Whereas MSAM has a point similar to TAM where PEOU and PU have a very important role in forming an intention in the use of a change in technology. In addition, the MSAM has also mentioned trust as one of the factors that have a role in the process of adopting technology according to this theory (Gao et al., 2008).

The results of the research conducted, UI and UX have a close relationship with the concept of PEOU where the role of UI and UX is to be able to make the application as a purchasing canal easy to use. As stated earlier that UI and UX has a function to be able to create a display (Interface) that can make application users feel comfortable and pleasant to

see and ease of process and flow (Experience) when using applications where there are no real difficulties or confusion. In the next discovery, discounts have a role as a stimulus for someone to be able to try a new thing because with the price cut, according to the main motives and interests of consumers in choosing goods that are as cheap as possible with the best quality possible. In this case, consumers will think that the products offered in the application will make them interested in trying to buy them through the application with the learning process to succeed in buying products through the application for the first time, which is driven by the discount role in the first place. Moreover, when the price is affordable due to the discount, it will cause an impression of high price value, and based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), price value will also impact on intention of use (Shin & Seo, 2017; Venkatesh, Thong, & Xu, 2012). Furthermore, consumers who feel good UI and UX function where there are no difficulties and obstacles; they will feel the benefit from the application where this kind of benefits or advantages have never been experienced before. The positive experience of shopping through a mobile application or device that already have will help them to increase the intensity of future application usage (Bigné, Ruiz, & Sanz, 2007). According to Ajzen (1991) about intention, there are some motivational factors that can drive and indicate how far people willing to try something new. Moreover, there are other consequences in terms of the intention of mobile application adoption process, namely cost, convenience, privacy, security, and efficiency (Direkwuttanakunchai & Yousapronpaiboon, 2017; Khalifa & Shen, 2008). This intention process will look very complicated when it is associated with these consequence factors, but some internal research results in getting that cost and also other consequence factors do explicitly show the relevance of the theory. And in the end, consumers will feel the benefits and complete the findings in the context of PU . The last factor found is that the company's reputation also has a connection with Davis et al. (1989) research on TAM where trust is one of the factors that can encourage someone to be able to adopt the technology, especially mobile phones, to support daily activities. The same results have also been shown by Chung and Holdsworth (2012) on the culture and behavioral intent to adopt mobile commerce among Y-generation research regarding the role of trust in the intensity of the use of mobile applications, where this trust relationship has an additional role, namely to reduce the risk of rejection of the potential for technology adoption by certain segments.
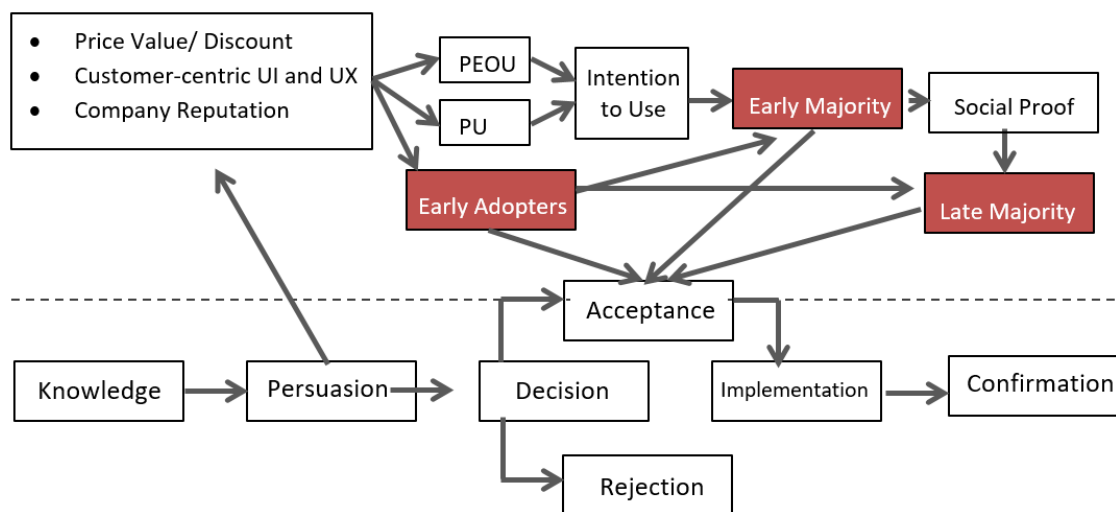

Figure 4 *Technology Adoption Process on Segmentation*

In Figure 4, the authors find that factors related to technology adoption namely Discount, UI and UX design, and Company Reputation are one of the efforts to persuade people to be able to choose between adoption or rejection. Early adopters are a generation, who have speed characteristics in technology adoption will be the earliest group to adopt, where when they have adopted technology, they become one of the triggers of other generations to be able to participate in adopting the technology. After knowing the factors that have a role in the technology adoption process, then the PU and PEOU factors (see appendix 2) will depend on Top Management Support (TMS) within the company (Kashada, Li, & Koshadah, 2018). This support will determine whether technology adoption will work well or not. This support can be seen from the formation of organizational structures, corporate culture, and implementation policies and technological capabilities themselves (Alvar, 2011). Then, the impact of PU and PEOU as explained by Gao et al. (2008) in his research will have an intention to use impact, where an increase in the intensity of use will make someone

have potential to use the application in the future. This factor, if combined with three factors of the author's research results, will help the early majority begin to adopt the application as a tool to make purchases. Based on information about the market share of the majority by (Richardson et al., 2015), 34% of the share of an early majority is enough to be able to make a social impact, where this social impact will affect more people to be able to adopt these changes. In the end, if the social environment has considered the change as normal, then the late majority in a certain period of time will slowly begin to adopt the technology.

Based on the results of research conducted by (Rogers, 2003), the previous decision-making process was based on the influence of factors that could persuade someone. The factors that we found were then decisive in being able to encourage the majority of generations to adopt the technology, where we combined the theory of MSAM on the role of PU and PEOU which can stimulate the majority generation with the process of intensity of application use as a purchasing channel while aspects which include strategic decision making related to the utilization of factors in the financial and operational aspects are not included in the explanation in this final result.

The results of this study have a discovery from previous research as a special supplement to the adoption process which is divided into various segments. Some of the segments discussed earlier have different processes in technology adoption. The results of this research have provided several suggestions for implementation in certain segments as described in Figure 4.

CONCLUSION

In this study, we see that the development of technology and smartphone users in Indonesia continues to increase and a company that does not follow changes in consumer behavior will lose its potential to develop in the future. Basically, not all generations are ready for changes to change, especially those based on technology. However, a company must be able to see the opportunities and possibilities of what will happen as an example that a mobile application will be one of the canals used as a future purchase tool. Moreover, the market size of the majority of generations is not be able to adopt the technology as fast as early adopters. The majority generation (early and late majority) have together more than 60% market shares, while the early adopters only have 13.5% (see appendix 3). The company has the challenge to jump the chasm that exists between the early adopters and early majority to gain bigger market shares.

Discounts are one of the factors that influence someone to get rid of doubts in buying something, the use of discounts will be able to help succeed the penetration process of a new technology for segmentation that is not ready for a change. However, the role of UI and UX in the application is also very important, where when a consumer tries for the first time an application caused by a discount, the easy process, and flow of an application and attractive interface will help the consumer feel that the change is giving a positive impact. In addition, the reputation of the company will help other segments to start trying because of a trust that results from a good reputation of a company.

Broadly speaking, the segmentation of the early majority and late majority, which as a whole has 68% market share has an important role for the sustainability of the company, and they have a different process with segmentation that is ready for technology adoption. The role of the three factors that we found that can have a positive impact on PU and PEOU and the character of the early adopters that can influence others through recommendations will make the early majority segmentation adopt that technology, where when the early majority can adopt technology, the social environment will get used to and affecting the late majority who are skeptical of change to study and adopt these technologies. However, the adoption process still has risks when saturation or technical problems begin to disrupt application users which will cause an increase in the number of installations and also have an impact on the sustainability of the company. This is a suggestion for future research on factors that cause a high number of uninstallations for an application.

ACKNOWLEDGMENTS

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APPENDICES

Appendix 1

According to the reseach about Factors Affecting Adoption of Mobile Service by Allil and Khan (2016), the PU supported IA

Chi-Square=199.89, df=120, P-value=0.00001, RMSEA=0.041
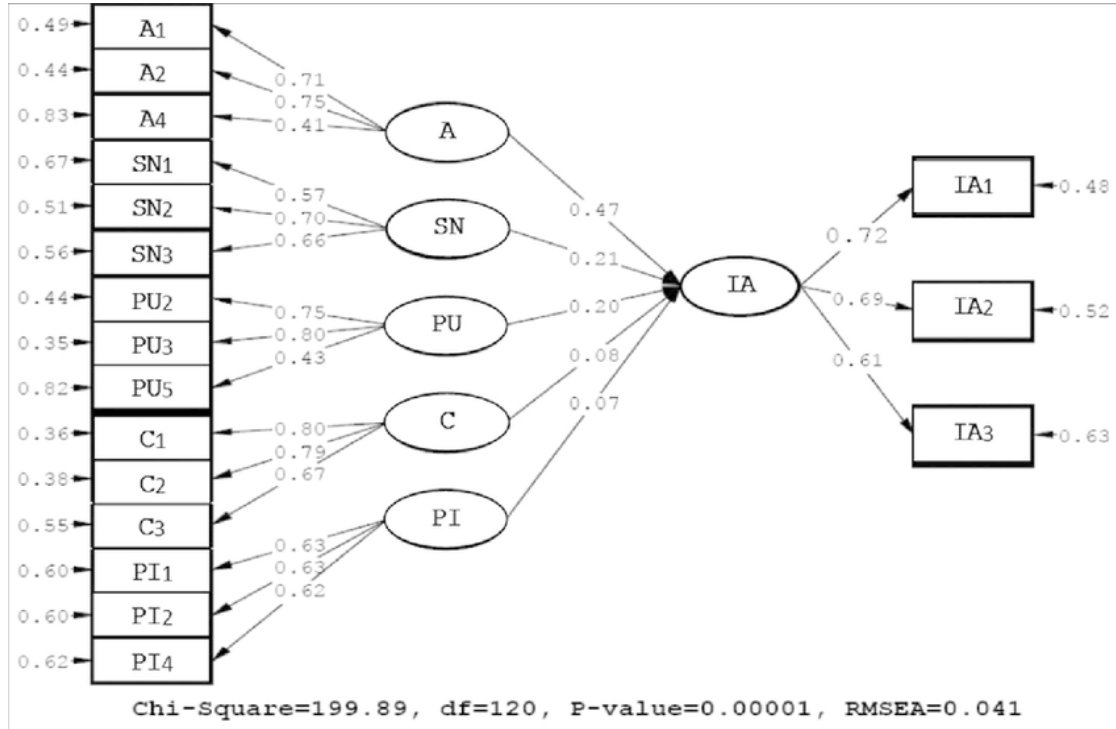
| Hypotheses	Paths	Parameter estimate (β)	Results
H1	A→IA	0.47	Supported
H2	SN→IA	0.21	Supported
H3	PU→IA	0.20	Supported
H4	C→IA	0.08	Supported
H5	PI→IA	0.07	Supported

MSAM: Mobile service adoption model, IA: Intention to adopt, A: Attitude, SN: Subjective norm, PU: Perceived usefulness, C: Compatibility, PI: Personal innovativeness, SEM: Standard error of mean

Source: Allil and Khan (2016) Factors Affecting Adoption of Mobile Service

Appendix 2

According to reseach about Analysis Approach to Identify Factors Influence Digital Learning Technology (DTL) Adoption and Utilization in Developing Countries by Kashada et al. (2018), PU and PEOU desribe the relation with the TMS and ended with the Adoption of DTL. However, the ICT Infrastructure directly impacting the DTL.
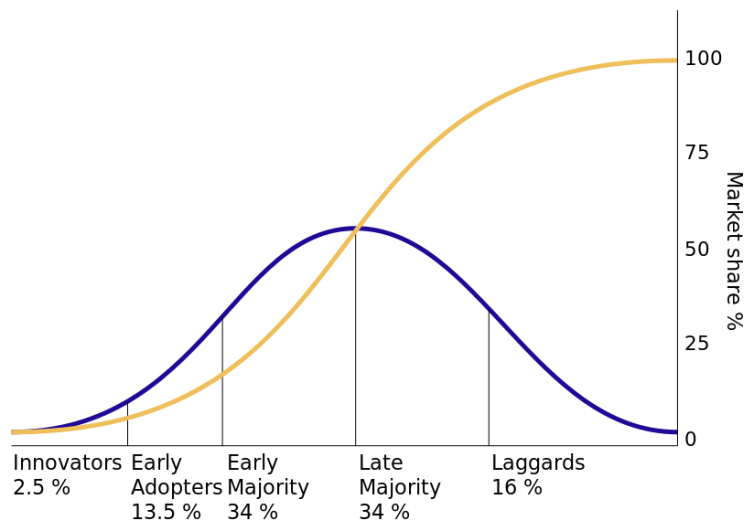
			Estimate	S.E.	P
TMS	<---	PEOU	0.272	0.073	***
TMS	<---	PU	0.329	0.082	***
TMS	<---	UA	0.228	0.069	.001
DLT	<---	ICT Infrastructure	0.255	0.068	***
DLT	<---	TMS	0.428	0.058	***

Chi-square = 5.88, df = 4, P-value = 0.20826, RMSEA = 0.050
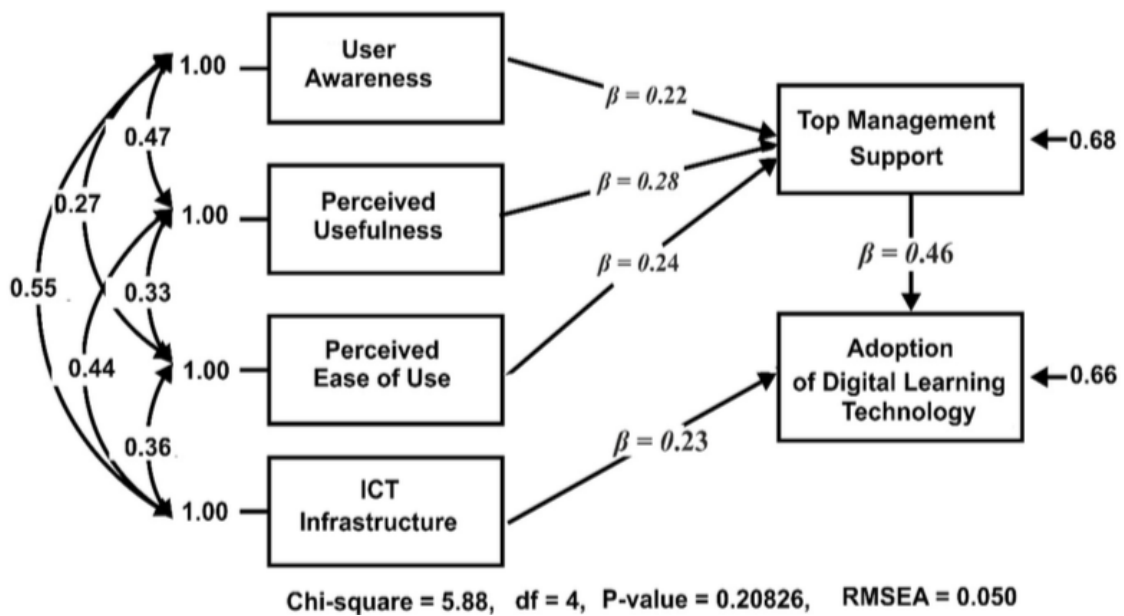
Source: Kashada et al. (2018). Analysis Approach to Identify Factors Influence DTL Adoption and Utilization in Developing Countries

Appendix 3

According to (Richardson et al., 2015) there are percentage of market segmentation based on the technology adoption readiness.

Source: Richardson et al. (2015)