MODERATING EFFECTS OF AGE & EDUCATION ON CONSUMERS' PERCEIVED INTERACTIVITY & INTENTION TO USE MOBILE BANKING IN MALAYSIA: A STRUCTURAL EQUATION MODELING APPROACH

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Abstract

Despite a remarkable magnitude of investigations has been undertaken in the field of mobile banking, limited amount of studies focus on the moderating effects of age & education on consumers' perceived interactivity & intention to use mobile banking. As a matter of fact, literatures on the critical ramifications of the age & education are lacking of quantified knowledge especially mobile banking. Therefore, there is a responsibility to measure the moderating effects of age & education level of Malaysian consumers' perceived interactivity & intention to use mobile banking. This examination integrates the Technology Acceptance Model with perceived cost, perceived interactivity and perceived risk while marinating the gaps as well as blending the diversities. The ambition of this study is to investigate quantitatively the moderating effects of Malaysian consumers' age & education level in the context of mobile banking through structural equation modeling strategy. This research is an addition to the limited number of literatures and also fills the gaps of previous studies. An exegesis of the findings resolves this writing.

Keywords: Consumers' Perceived Interactivity, Moderating Effects, Age, Education , Mobile Banking, Structural Equation Modeling

INTRODUCTION

Mobile banking is relatively a new area with limited studies about it in the Malaysian context (Amin *et al*, 2007). Over the time period, Malaysian banking industry grew from paper based towards card based. Then came internet banking which even progress further into mobile banking (Mohammad, 2008). Homologously, Wikipedia encapsulates that the Mobile banking is a technological breakthrough that authorizes clients of financial centers to carry out various financial transactions by means of a mobile device such as a mobile phone or tablet. Innovative mobile applications are invented in string with the mobile banking transformation. Maybank became the first financial institution in Malaysia to initiate a free banking application, M2UMap on the newly launched iPhone then (Maybank2u, 2009). Later, CIMB Clicks was postulated by CIMB Bank Berhad which intensified to be the most celebrated banking app by Malaysians. Positively, almost all the banks in Malaysia offers mobile banking services (Masrek *et al*., 2012).

Research on technology adoption is continuously being performed. In spite of that, little studies come to grips with the moderating effects of age & education on consumers' perceived interactivity & intention to use mobile banking ingrained in the Malaysian vista. However, Malaysia's mobile banking pursuit is still and all in its infancy stages. Basically, mobile banking is underemployed in the Malaysian sphere (Amin *et al*., 2007). This is congruous with the surveillance of Bank Negara Malaysia in Q4 2015 that divulged that there are 7.278 million subscribers of mobile banking services' which is virtually lower as compared to the mobile phone ingression rate of 143.8% in the Q4 2015 published by the Malaysian Communications and Multimedia Commission (Bank Negara Malaysia, 2016). Hence, this is indeed a wakeup call to investigate this imbalance scenario.

Therefore, the fundamental goal of the study is to discover the moderating effects of age & education on consumers' perceived interactivity & intention to use mobile banking.

LITERATURE REVIEWS

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was composed by Fred Davis professes that external stimulus comprising actual system's features and capabilities exercise control over the clients' prompting to utilize the system which predicts its utilization. According to Davis, users' motivation of actual usage is subject to the ambience of perceived ease of use, perceived usefulness and attitude towards using a system in addition to users' behavioral intention (Davis *et al*, 1989).

Age & Education

Demographic characteristics is been used by many researchers to improve the explanatory power of consumer's intention to use new technologies. Agarwal and Prasad (1999) examined the individual divergences influencing the acceptance of new information technologies at a Fortune 100 corporation in the Midwest, U.S. that revealed that education level has an ascertainable denouement on perceived ease of use. Kolodinsky *et al* (2004) found that age has significant impact on users' intention to adopt electronic banking technologies in the United States of America. However, education exhibited insignificant effect with respect to the intention to adopt electronic banking. Porter & Donthu (2006) examined the role of demographics and perceived access barriers on internet usage among consumers in a major metropolitan area of Southeastern United States which revealed that consumers' age is significantly associated with perceived ease of use of the internet. Additionally, age is insignificant in relation to perceived usefulness of the internet. However, consumers' education level is found to be significantly associated with their perceived ease of use of the internet.

Gounaris and Koritos (2008) found that consumer's age and education influences the decision of internet banking adopters in Greece. On the other hand, Wang *et al* (2009) investigated the determinants of m-learning acceptance together with the variations of age in the acceptance of m-learning among potential m-learning Taiwanese. The findings stipulated that age moderates the relationship of effort expectancy and social influence with m-learning use intention. Boroumandfar *et al* (2010) examined the mothers' attitude towards over weight preschool children's nutritional patterns in Isfahan province, Iran which revealed that parents' education level significantly influences their attitude and behavioral intention about nutritional patterns.

Ataran & Nami (2011) found that education level significantly influences the Iranian high school teachers' perceived ease of use when dealing with technology acceptance decision making. Ahad *et al*
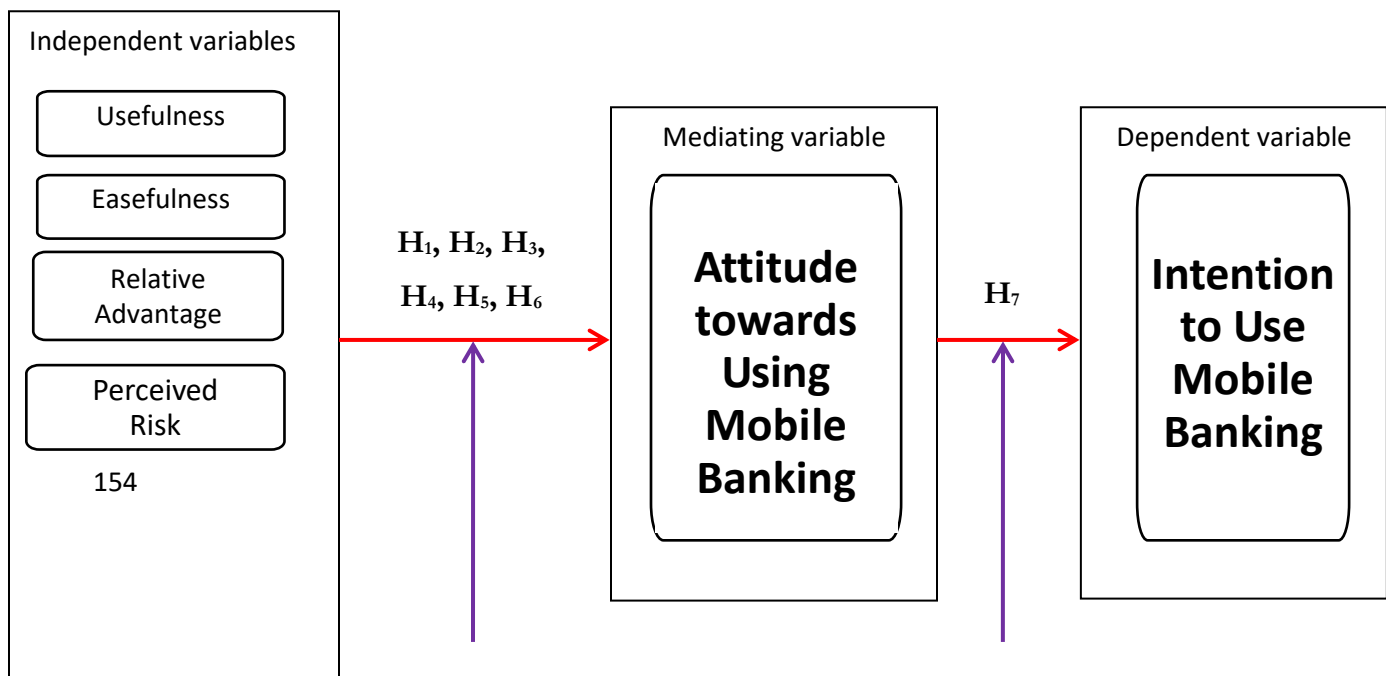
(2012) learned that education is a demographic ingredient that has significant ramifications on the adoption of m-banking in rural Bangladesh. However, age is insignificant with respect to the intention to adopt m-banking. Yousafzai & Yani-de-Soriano (2012) found that age mitigates the confederation between perceived usefulness of internet banking and behavioural intentions to use internet banking in United Kingdom. Mardikyan *et al* (2012) found that age does not have significant effect on the behavioral intention to use 3G technology among users' of Istanbul. However, consumers' educational levels influences significantly their behavioral intention to use the 3G technology.

Kurkinen (2013) investigated the effect of age on technology acceptance among field police officers in Finland. The result shows that age did not effect the bond enclosed by perceived usefulness and perceived ease of use. Furthermore, there were no age differences in the relationship between those two factors with behavioral intention. Consumers' age displayed significant effect on individual's attitudes to adopt mobile payment services in Sweden (Arvidsson, 2014). Khechine *et al* (2014) examined the effects of age in moderating factors that conceive students' acceptance of Elluminate, a webinar system, in a blended learning course at Canada's Laval University that revealed that the age nurtures considerable moderating effect between performance expectancy and facilitating conditions in relation to intention to use Elluminate. Interestingly, Teo & Milutinovic (2015) found that age to be insignificant among pre-service teachers' intention to teach mathematics using technology for in Serbia. Isa & Wong (2015) found that age is not a significant moderator in relationships pertaining to Malaysians' and Taiwaneses' intention to use internet marketing. Similarly, Yadav (2016) found that age displayed insignificant effect on the intention of bank customers to adopt i-banking while confirming a significant relationship between education of customers and intention to adopt i-banking services.

RESEARCH MODEL DEVELOPMENT

Model Specification

In a study, four types of variables are available which is known as dependent variable, intervening variable, moderating variable and independent variable. In depth literature reviews were taken in order to develop the research framework as shown in Figure 1. Worth to mention studies by Kolodinsky *et al* (2004), Wu *et al* (2015), Arvidsson (2014), Hsieh (2015), Tung *et al* (2014), Li *et al* (2015) & Yadav (2016) has been a magnificent source of knowledge for this study. The moderating variable is the main highlight in this research. The cravings of this inquest is to comprehend together with quantifying the moderating effects of age & education.

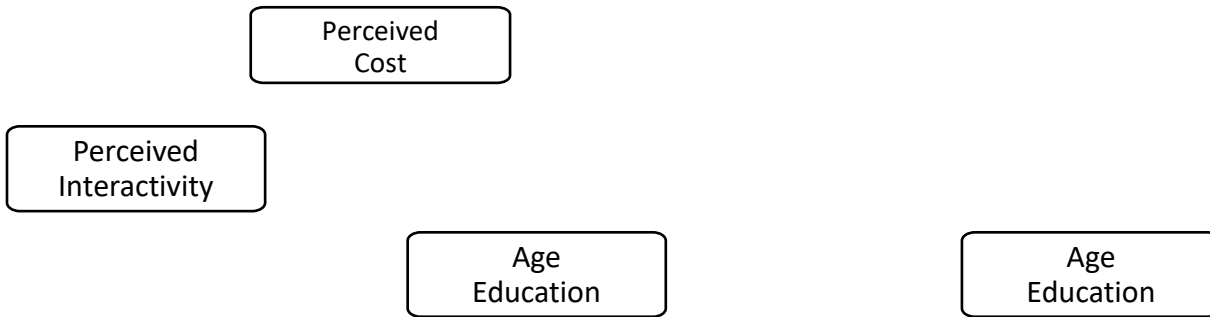| Independent variables		
Usefulness		
Easefulness		
Relative Advantage	$H_1, H_2, H_3,$ H_4, H_5, H_6 →	Mediating variable **Attitude towards Using Mobile Banking**
Perceived Risk		H_7 →	Dependent variable **Intention to Use Mobile Banking**

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Figure 1: Research Framework of moderating effects of Age & Education on consumers' perceived interactivity & intention to use mobile banking in Malaysia

Simultaneously, seven hypotheses are devised for each moderating variable as below:

Age

H_{1a}: Age moderates the relationship between Usefulness & Attitude Towards Using Mobile Banking.
H_{1b}: Age moderates the relationship between Easefulness & Attitude Towards Using Mobile Banking.
H_{1c}: Age moderates the relationship between Relative advantage & Attitude Towards Using Mobile Banking.
H_{1d}: Age moderates the relationship between Perceived Cost & Attitude Towards Using Mobile Banking.
H_{1e}: Age moderates the relationship between Perceived Risk & Attitude Towards Using Mobile Banking
H_{1f}: Age moderates the relationship between Perceived Interactivity & Attitude Towards Using Mobile Banking.
H_{1g}: Age moderates the relationship between Attitude Towards Using & Intention to Use Mobile Banking.

Education

H_{2a}: Education moderates the relationship between Usefulness & Attitude Towards Using Mobile Banking.
H_{2b}: Education moderates the relationship between Easefulness & Attitude Towards Using Mobile Banking.
H_{2c}: Education moderates the relationship between Relative advantage & Attitude Towards Using Mobile Banking.
H_{2d}: Education moderates the relationship between Perceived Cost & Attitude Towards Using Mobile Banking.
H_{2e}: Education moderates the relationship between Perceived Risk & Attitude Towards Using Mobile Banking.
H_{2f}: Education moderates the relationship between Perceived Interactivity & Attitude Towards Using Mobile Banking.
H_{2g}: Education moderates the relationship between Attitude Towards Using & Intention to Use mobile banking.

Stratified sampling method is used which was based on Malaysia's age pattern is one way another a least biased probability sampling method that uniquely thrived with the limited money obtainable for this study. In fact, it saves time and energy too (Sekaran & Bougie, 2009). Data was collected in the using paper based survey questionnaire comprising dichotomous, interval, category and Likert scales questions

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within seven weeks during Dec 2015 – Feb 2016 in the Klang Valley. Out of 1000 questionnaires that was distributed, only 398 was deemed usable for this study's Structural Equation Modeling analysis technique.

Model Estimation

This study is part of a larger study in which the factors influencing the Malaysian consumers' intention to use mobile banking services is evaluated. On the whole, an in depth study right from the stage of collecting data to empirically analyzing it is executed. In short, the process of identifying the underlying dimension of the constructs to reducing it to a reliable model fit has been achieved. Basically, the process of Exploratory Factor Analysis and Confirmatory Factor Analysis is completed. Furthermore, both direct and indirect path analysis of Structural Equation Modeling approach has been accomplished. All these can be viewed in the papers published in Darmesh *et al* (2016). Therefore, in this paper, the principal center of attention will on determining the **moderating effects of consumers' age & education level** with regards to usefulness, easefulness, relative advantage, perceived interactivity, perceived cost, perceived risk, attitude towards using mobile banking and intention to use mobile banking.

Moving forward will be on the moderating effect of the demographic variables between the latent variables. Moderating variable is a qualitative or quantitative variable that alters the strength of the relationship an independent or predictor variable and a dependent or criterion variable (Baron & Kenny, 1986). In this study, age and education are the moderating variables tested using AMOS's multi group analysis. The alternate hypothesis is accepted if the regression path is significant in the sense that p values as less than 0.05 and also via comparison test of the confidence intervals.

Moderating effects of Age

Variable age is one of the moderating variables in this study. Age was initially classified into seven categories as shown in Table 1.

Table 1: Descriptive statistics of the Age of the respondents.

Age Grouping	Frequency	Percent
18 to <26	40	10.1
26 to <30	79	19.8
30 to <35	80	20.1
35 to <40	59	14.8
40 to <45	61	15.3
45 to <50	40	10.1
>50	39	9.8
Total	398	100

The limited respondents of some of the subgroups caused unsuitability to implement statistical analysis. In order to test its moderation effect, it's reorganized into two categories as shown in Table 2.

Table 2: New Age Groupings

Age	Frequency	Percent	Valid Percent	Cumulative Percent
18 to 30	119	29.9	29.9	29.9
>30	279	70.1	70.1	100.0
Total	398	100.0	100.0	

The results of moderating effects of Age were tested in AMOS using multi group analysis is presented in Table 3.

Table 3: Moderating Effects of Age

Model	Chi-Square	df	P-Value
Unconstrained	3250.685	1372	
Constrained	3355.896	1449	
Number Of Groups		2	
Difference	105.211	77	0.018

Table 3 shows that the p-values of Age are less than 0.05. Thus, Age moderates at least one of the paths in the model. Employing the bootstrapping technique of 1000 resamples, the confidence intervals and regression weights of Age on the various relationships were obtained as shown in Table 4 and Table 5.

For the age groups (18 to <30), relationships from Usefulness, Perceived Risk, Perceived Interactivity to Attitude Towards Using Mobile Banking is significant as shown in Table 4.

Table 4: Regression Weights of Age (18 to <30)

Exogenous variable	Endogenous variable	Estimate*	95% Confidence interval*		P-value
			Lower	Upper	
Usefulness	Attitude Towards Using Mobile Banking	0.317	0.044	0.577	0.029
Relative Advantage	Attitude Towards Using Mobile Banking	0.082	-0.14	0.297	0.401
Perceived Risk	Attitude Towards Using Mobile Banking	-0.228	-0.398	-0.093	0.001
Perceived Cost	Attitude Towards Using Mobile Banking	-0.07	-0.209	0.07	0.356
Easefulness	Attitude Towards Using Mobile Banking	0.165	-0.106	0.415	0.228
Perceived Interactivity	Attitude Towards Using Mobile Banking	0.29	0.07	0.487	0.011
Attitude Towards Using Mobile Banking	Intention to Use Mobile Banking	1.043	0.874	1.203	0.002

*Unstandardized regression weight

In addition, relationship from Attitude Towards Using Mobile Banking to Intention to Use Mobile Banking is also significant. In other words, the aforementioned paths are significant (see Table 4). For the age groups (>30), all paths are significant except the relationship from Perceived Interactivity to Attitude Towards Using Mobile Banking (see Table 5).

Table 5: Regression Weights of Age (>30)

Exogenous variable	Endogenous variable	Estimate*	95% Confidence interval*	P-value

			Lower	Upper	
Usefulness	Attitude Towards Using Mobile Banking	0.21	0.035	0.388	0.009
Relative Advantage	Attitude Towards Using Mobile Banking	0.182	0.057	0.306	0.006
Perceived Risk	Attitude Towards Using Mobile Banking	-0.179	-0.264	-0.099	0.001
Perceived Cost	Attitude Towards Using Mobile Banking	-0.159	-0.282	-0.052	0.006
Easefulness	Attitude Towards Using Mobile Banking	0.25	0.08	0.417	0.004
Perceived Interactivity	Attitude Towards Using Mobile Banking	0.058	-0.063	0.193	0.368
Attitude Towards Using Mobile Banking	Intention to Use Mobile Banking	1.031	0.901	1.187	0.001

*Unstandardized regression weight

The path Usefulness to Attitude Towards Using Mobile Banking is in significant association in both age groups. However, in comparing the confidence intervals in both age groups, there is no significant moderation effect. Additionally, the path Perceived Risk to Attitude Towards Using Mobile Banking is significantly associated in both age groups. Despite that, there is no significant moderation effect when the confidence intervals in both age groups are tested via comparison. Similarly, the path Attitude Towards Using Mobile Banking to Intention to Use Mobile Banking has significant association in both age groups but comparison test of the confidence intervals revealed that there is no significant moderation effect.

In a nutshell, all the hypothesized paths in regards to moderating effect of age in relationships between the latent variables of the research model is not supported by the data, hence, the significance of the corresponding hypotheses is refuted.

Moderating effects of Education

Variable Education is also a moderating variable in this study. Education was classified into five categories in the early stage as shown in Table 6.

Table 6: Descriptive statistics of the Education of the respondents

Education Level	Frequency	Percent
Foundation / Pre-U	19	4.8
Diploma	77	19.3
Degree	94	23.6
Postgraduate (Masters)	199	50.0
Phd / Doctorate	9	2.3
Total	398	100

The limited respondents of some of the subgroups caused unfitness to implement statistical analysis. In order to test its moderation effect, it's reorganized into two categories as shown in Table 7.

Table 7: New Education Groupings

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Foundation / Pre-U / Diploma / Degree	190	47.7	47.7	47.7
Postgraduate (Masters) / Phd / Doctorate	208	52.3	52.3	100.0
Total	398	100.0	100.0	

The results of moderating effects of Education were tested in AMOS using multi group analysis is presented in Table 8.

Table 8: Moderating Effects of Education

Model	Chi-Square	df	P-Value
Unconstrained	3358.28	1372	
Constrained	3499.315	1449	
Number Of Groups		2	
Difference	141.035	77	0.000

Table 8 shows that the p-values of Education are less than 0.05. Thus, Education moderates at least one of the paths in the model. Employing the bootstrapping technique of 1000 resamples, the confidence intervals and regression weights of Education on the various relationships were obtained as shown in Table 9 and Table 10.

For the Education groups (Foundation / Pre-U / Diploma / Degree), relationships from Usefulness, Perceived Risk, Perceived Interactivity to Attitude Towards Using Mobile Banking is significant. Moreover, relationship from Attitude Towards Using Mobile Banking to Intention to Use Mobile Banking is also significant. In plain English, the aforementioned paths are significant as shown in Table 9.

Table 9: Regression Weights of Education (Foundation / Pre-U / Diploma / Degree)

Exogenous variable	Endogenous variable	Estimate*	95% Confidence interval*		P-value
			Lower	Upper	
Usefulness	Attitude Towards Using Mobile Banking	0.281	0.062	0.509	0.012
Relative Advantage	Attitude Towards Using Mobile Banking	0.15	-0.022	0.344	0.092
Perceived Risk	Attitude Towards Using Mobile Banking	-0.197	-0.283	-0.122	0.002
Perceived Cost	Attitude Towards Using Mobile Banking	-0.134	-0.282	0.01	0.069
Easefulness	Attitude Towards Using Mobile Banking	0.203	-0.039	0.441	0.1
Perceived Interactivity	Attitude Towards Using Mobile Banking	0.163	0.02	0.346	0.03
Attitude Towards Using Mobile Banking	Intention to Use Mobile Banking	0.98	0.847	1.118	0.003

*Unstandardized regression weight

Similarly, for the Education groups (Postgraduate (Masters) / Phd / Doctorate), all paths are significant except the relationship from Perceived Interactivity to Attitude Towards Using Mobile Banking (see Table 10).

Table 10: Regression Weights of Education (Postgraduate (Masters) / Phd / Doctorate)

Exogenous variable	Endogenous variable	Estimate*	95% Confidence interval*		P-value
			Lower	Upper	
Usefulness	Attitude Towards Using Mobile Banking	0.207	0.031	0.391	0.029
Relative Advantage	Attitude Towards Using Mobile Banking	0.175	0.054	0.299	0.002
Perceived Risk	Attitude Towards Using Mobile Banking	-0.195	-0.325	-0.081	0.002
Perceived Cost	Attitude Towards Using Mobile Banking	-0.099	-0.225	-0.013	0.026
Easefulness	Attitude Towards Using Mobile Banking	0.27	0.106	0.465	0.002
Perceived Interactivity	Attitude Towards Using Mobile Banking	0.087	-0.048	0.234	0.185
Attitude Towards Using Mobile Banking	Intention to Use Mobile Banking	1.077	0.942	1.248	0.001

*Unstandardized regression weight

The path Usefulness to Attitude Towards Using Mobile Banking is in significant association in both education groups. Nevertheless, in comparing the confidence intervals in both education groups, there is no significant moderation effect. Additionally, the path Perceived Risk to Attitude Towards Using Mobile Banking is significantly associated in both education groups. However, there is no significant moderation effect when the confidence intervals in both education groups are tested via comparison. In similar fashion, the path Attitude Towards Using Mobile Banking to Intention to Use Mobile Banking has significant association in both education groups but comparison test of the confidence intervals revealed that there is no significant moderation effect.

In a capsule, all the hypothesized paths in regards to moderating effect of education in relationships between the latent variables of the research model is not supported by the data, hence, the significance of the corresponding hypotheses is debunked.

Hypothesis Summary

Interestingly, in testing the moderating effect of the demographic variables, age and education via this Structural Equation Modeling quest, it's discovered that age and education failed to moderate all the hypothesized paths of the research model. Hence, the corresponding hypotheses is not supported by the data. Table 11 summarizes it.

Table 11: Research Hypothesis Validity

Regression Path	Hypothesis	Findings
Moderating Effects of Age and Education		
Usefulness → Attitude	H_{1a}, H_{2a}	Not Supported

Regression Path	Hypothesis	Findings
Easefulness → Attitude	H_{1b}, H_{2b}	Not Supported
Relative Advantage → Attitude	H_{1c}, H_{2c}	Not Supported
Perceived Cost → Attitude	H_{1d}, H_{2d}	Not Supported
Perceived Risk → Attitude	H_{1e}, H_{2e}	Not Supported
Perceived Interactivity → Attitude	H_{1f}, H_{2f}	Not Supported
Attitude → Intention	H_{1g}, H_{2g}	Not Supported

CONCLUSION

In this study, it is recognized that Age and Education Level are insubstantial moderators with regards to consumers' perceived interactivity & intention to use mobile banking. This resonates with the findings of Kolodinsky et al (2004) that education displayed insignificant effect with respect to the intention to adopt electronic banking. Additionally, Ahad *et al* (2012) confirmed that age is insignificant in connection with the intention to adopt m-banking. At the same time, Mardikyan *et al* (2012) asserted that age does not impose significant effect on the behavioral intention to use 3G technology among consumers' of Istanbul. On the other hand, Teo & Milutinovic (2015) propounded that age is insignificant among pre-service teachers' intention to use technology to teach mathematics. Furthermore, Yadav (2016) reaffirmed that age inflicted insignificant effect on the intention of bank customers to adopt i-banking services. Hence, the empirical findings of this study that Education and Age are insignificant moderators with respect to peoples' intention to use mobile banking is similar and confirms with the findings of previous scholars.

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