Factors influencing mobile money transaction service adoption in Ghana, using a Technology Acceptable Model and Diffusion Theory

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Abstract

The investigation and exploration of factors influencing the acceptance of mobile money transaction services in Ghana. The research proposes an integration of construct used in both Diffusion Theory (DT) as well as Technology Acceptable Model (TAM). The research was conducted on 2,298 mobile money users spread across Ghana’s sixteen (16) regions. According to the study, perceived risk perceived cost, and social influence all had repercussions on perceived usefulness and ease of use, which influenced users' final decision to use mobile money banking services, resulting in its exponential growth in Ghana. The factor of compatibility, observability and trialability of DT were suitable variables in determining users' choice of technology and the adoption of its services. The results indicated that utilising the technology model, TAM and DT could be expanded to understand better the mobile money ecology for both users and industry players in Ghana's digital money transaction services.

1. Background And Motivation To The Study

Mobile money financial system provides a wide range of financial services (1), such as merchant micropayments, person-to-person financial transfers between individuals, utility bill payments, checking bank accounts, and long-distance remittances (2, 3). A mobile money system is currently provided through various organisations and business strategies that are peculiar to the present or service providers. The services rendered by mobile money is provided exclusively by banks. In contrast, others are offered solely through telecoms operators, and yet others require government-regulated partnerships among a financial institution and a telecommunications provider (4,5). Regulatory variables, which also differ widely between countries, have a significant role in deciding which products could be offered through which institutional framework (6).

Mobile money banking solutions in Ghana has been around for sixteen years and can be considered vital in the fintech sector (7). From a modest beginning in 2009, mobile payment solutions today contribute significantly to the level of cash flows that exceed the country's total traditional financial transactions. The number of registered mobile money customers as of the end of 2019 stood at 32.4 million, a growth of 205 percent over the 2015 position. Additionally, as of 2019, there were 14.5 million active mobile money accounts. In 2019, the active registered agent of the four mobile money operators (MMOs) totalled 306 thousand, an increase of 90.9 percent of last year's figure. With a cumulative floated amount of GH3.6 billion in 2019, the overall amount of mobile money transactions reached GH309 billion, representing a 121.5 percent increase over the 2016 outcome(8). Ghana's mobile telecommunications industry (GMTI) is among the most competitive industries in Africa, considering massive foreign actors in the telcos industries (9) and has also been generally viewed as another of Ghana's most influential aspects of the economy. Mobile telephone subscribers stood at 40 million at the end of 2019, depicting a 145 percent increase from 17 million in 2010 (10). In Ghana, the mobile money services industry has grown rapidly in recent years. The emergence of mobile money in Ghana has altered how business is conducted(11).

There is sufficient research on mobile money and mobile banking, in the areas of stakeholders perspective (12,13), individual performance (14,15,16) service quality (17,18,19), developing country (20,21,22), security(23,24,25) and as a tool in an emerging economy (26,27) indicating the impact on the financial growth it has brought to those countries, and most importantly the users of the services of the mobile money banking service. This does not give a clear picture as to why mobile money cannot be said to be the case in Ghana. As in the case of Ghana, there is not enough scientific and empirical evidence as to what has contributed to the introduction, implementation and growth of mobile money in Ghana. Some mobile money and mobile banking research have concentrated on just a cross-section of the demographic population without giving that holistic overview about the user (28,29,30).

This research encapsulates, with the extension on demographic scope, the whole users of mobile money in Ghana, which included workers, students, employed and unemployed who have adopted mobile money services.

1.1 Motivation and purpose

The research examines mobile money and the upsurge in growth and the factors accounting for such growth in Ghana, using both the Technology Acceptable Model (TAM) and Diffusion Theory (DT).

The number of unbanked citizens is very high in Ghana as has been the case in most developing countries (31, 32, 33, 34); as a result, when there is a system that is making citizens or users develop a keen interest in the banking system at both the micro and macro levels, it is worth to examine such a phenomenon.

To this, the following study questions were posed to the participants:

a. What are the determinants factors influencing mobile money banking in Ghana?

b. What effect do these variables have on the financial ecology of mobile money?

2. Literature Review

The general discussion about banking was mostly on the mortal and bricks banks. However, the narrative changed in the operation of banking services. In Ghana, since the inception of the telcos, there has been a new trend of banking, from the mortal and brick ways of banking to mobile money banking just as was done in Kenya with Mpesa. The backbone of Ghana's mobile money banking penetration by the telcos in the services of mobile money was as a result of the structures introduced by the BOG, which then allows the telcos to operate within the banking services, as digital money transaction services with the main supervision from BOG. This single policy was a game-changer in the banking industry, especially for the unbanked Ghanaians.

The literature review considers the factors in both TAM and DT that were taken into account in the conceptualise framework of the study, which can be seen in Fig. 1.3 here. There is sufficient research on

the need for technology through determining users' adoption of technology-oriented products or services. Other technology innovation theory models were also used to elaborate technology adoption. For instance, the Theory of Planned Behaviour (TPB), is mostly used by an organisation when introducing new technology products. TPB gives an explicit outcome on the service the organisation is projecting. The Theory of Reasoned Action (TRA) is used mostly with the view that the individual has extraordinary control in the final decision in the choice of the technology adoption. The technological acceptable model (TAM) is constructed that, the technology used or adoption is influenced through other indirectly mediating factors. However, each of these theories is segmented into exogenous and endogenous variables. In the case of TAM, the exogenous factors affect adoption through, the perceived ease of use and perceived usefulness.

The question of why technology is accepted in association with a product has long been discussed and it is very critical for the organisation and business growth (35, 36, 37, 38). The question most study sort to do, which is not different from this current research, is to determine the veracity, reliability, consistency in the technology adopted within the scope of that study. The theoretical model used mostly depends on the philosophical axiom proposed by the motivation and the study's objectives. Given that, the philosophical axiom for this study is that technology influenced the digital money transaction service in Ghana. This then led to the use of both TAM and DT in the conceptual model. The following section will consider the related variables in the theories used and their determined relation to the principal focus of the study.

2.1 Technology Acceptable Model (TAM)

The TAM has widely been accepted in the field of study for both Information Science and Information Technology. Apart from the perceived ease of use and perceived usefulness associated with TAM with other dimensions, this has been extended with another antecedent, namely, social influence and cognitive influence. To take on its name as an extension of the technology acceptance model (TAM), this extension was improved on the prediction associated with perceived usefulness. However, this study was limited in respect of not using all the constructs associated with TAM. One of such reasons for that decision was based on the fact that we are combining TAM to DT and, also introducing other constructs to these models, to avoid too many variables to be analysed.

a. The attitude of users toward mobile money banking

The concept of adopting and acquiring technology varies; the latter depends on the user's beliefs and the former depends somewhat on the user's attitude regarding technology. Subsequently, these two perceptions may change with time and purpose within the consideration of the individual's interests. The attitude of users in technology acceptance has been proven to be one of the most important variables in the exogenous construct in TAM. Positive user attitudes to technology are critical to determining the actual usage of service or technology (39,40,41,42,43,44). There are other inherent external variables subject to the user's attitude to technology adoption. Users' attitudes have been positively influenced by

their perceptions of the value of technology with their business and the perceived ease of use of technology (45,46,47,48,49,50,51)

b. The behavioural intentions of users about mobile money banking

According to Davis' TAM theory (52), one's attitude has a lot more influence on their behavioural intention to utilize a certain service or technology (53,54,55). When a user has a positive attitude about technology or its connected services, the likelihood of using that technology increases (56,57).

Other factors influence one's behaviour in making a decision based on choice; critical of such factors is attitude. Invariably, because of additional characteristics, including perceived cost, attitude, usefulness, trust, observable social influence, it is not out of place that these factors also influence behavioural intentions. Attitude is objective in determining users' predictive intention to use a particular technology and service cannot be left out in most studies, which includes information technology, information science, e-commerce, and many other studies relating to one's positive intention to use technology. User attitude has become a fundamental factor in such studies (58,59).The performance of the behaviour is heralds the performance of the behaviour, subject with one's behaviour (60,61,62). It is much the case that one's behavioural intentions will positively influence their attitude to the actual usage of technology.

c. The perceptions of perceived risk about mobile money banking ecology

A user's risk about a subject matter, have a correlated effect in their adopting or rejecting that technology or service (63), in this instance is mobile money banking services. This was first expressed by Cummingham (1967,64) where he submitted that the risk hinges on these two factors "uncertainty and consequences" when a consumer is unsure or have no immediate and future desire or use for a product or service, that renders or determine that product cost, which was referred to as the "consequence". It is, therefore, necessary to determine or appreciate at any point in time why a consumer will use a particular product it is equally important to know what influence consumer to have an interest in the choice of product or services. There is sufficient study on the type of risk to the determination of choice by a consumer preference. The study considered by Mitchell (1992,65) management decision on understanding consumer behaviour, he classified perceived risk into six categories; social, financial, physical, performance, time, and psychological. Mitchell professes an explanation for each category. The social vulnerability is that the customer's choice of financial institution will have a negative impact on the impression of other people about the consumer. Then there is the financial liability that perhaps the service acquired may not result in the greatest economic benefit for both the consumer.

According to Wang et al (2019, 66) risk could be at the aggregate or disaggregate level, where aggregate categories are more risk-averse as a result could less likely to adopt as compared to the disaggregated level.

d. The perceived usefulness of mobile money banking service

Perceived usefulness within TAM demonstrates how the technology or system used could aid a user's performance in achieving their positive job outcome as much as necessary (67,68,69) There is a considerable belief that every individual's perceived usefulness with technology will influence their willingness to use the service and technology provided (70,71). It is equally true that perceived usefulness has an impact on the user's attitude in the kind of decision they arrived at in adoption to technology (72,73,74). Countless matters interest a user in the choice of technology; and one of such is the timely service rendered in response to service needed, which mobile money banking service is given to their users. It is also undeniable that perceived usefulness does not always have a favourable impact on user attitudes when the risks of the technology are in dispute; it may dissuade the user from approving or rejecting that technology (75).

e. The perceived ease of use of mobile money banking services

Among the most important variables in determining whether technology is accepted or rejected is perceived ease. according to Davis (1989,52). There have been other studies that concluded with the same outcome (76). Technology or new systems are developed with the belief that they will be accepted. Every technology is set to achieve this target but it is certainly not automatic in most cases.

This then becomes a subject that has to be studied at the course of every technology or system to ascertain whether this perception is targeted. Given that, perceived ease of use has enabled technology concept and development to be purposeful and relevant. This factor is not different from the case of Ghana, even with a little over 40 percent educated population, having 32 million mobile money banking users. It is clear from the study of Hampshire (2016,77) on smartphone mobile banking use in the UK that education and age do not influence one's use of the mobile phone in the circumstance of his experiment area and subject.

f. The perceived cost of mobile money banking

The user's inability to use any technology is influenced by several reasons and one of such is the usefulness of that technology to honour the user's immediate request to user services. The usefulness of mobile money banking services come with service charges rendered to parties, thus; the sender and recipient on whom those services are given. The service charges related to the telcos varies from one service provider to the other. The service cost with mobile money banking is characterised by the service providers is deemed too high, in some cases both the sender and recipient are charged for the same services (eg MTN Ghana, mobile money). Given that, some service providers have started to change the narrative on the services charges as may be the case to beat the competition making service charges free for both the sender and recipient (eg Vodaphone Ghana, mobile money)

Mobile money users are equally cost objective just as any other individual will be, so when the cost of operation, (transaction and maintenance) increases, this will, in turn, deter users (78,79). This theory has not been proofed for users that bank with main banking services user in comparison to nonbanking (mobile money) individuals. However, this is not the case in all cases, when users ruminate the cost of

what they spend travelling to cash out or transfer with their banks these inconveniences at times convince a user to opt for mobile money banking as an alternative (80). According to researchers (81,82), apart from the benefit, the customer is presumed to get from mobile money services, the expected cost related to mobile money services could guarantee a negative attitude to adoption as has also been recognized by Abayomi et al., (2019,83). Throughout their analysis, they indicated that most of the banks attempt to improve on the cost of service so they have opted for internet banking service, which tends to reduce cost for users (84,85).

g. The perceived trust in the mobile money banking ecology

Trust does indeed have a favourable effect on a user's attitude. From other research perspectives, trust influences behavioural intention, irrespective of age, academic, gender and culture to use mobile money banking (86,87,88).

There are more than twenty-nine (29) types of trust identity according to Soderstrom (2009,89). He did categorise trust into three-set; technology, organisation and person. Trust, therefore, is demonstrably the option for the user. Trust in mobile money service is very broad; however, it is mostly limited to, the devices, application, operators (Telecos), the regulation and network infrastructure (90,91). Trust encapsulates the fact that the user strongly expects that their data and transaction information that is primarily handled by the operators and the banks are not misused or trade-off but is kept safe (92,93,94,95). This could be done when all the players put in appropriate measures to ensure and assume the trust needed. Most studies have linked a favourable impact on user attitudes to a moderate contribution to behavioural technology acceptance(96,97,98,99). The influence of trust on adoption is universal, regardless of age or gender(100).

2.2 Diffusion Theory(DT)

The use of DT is to help understand the diversity associated with users' decisions that come with the adoption of technology. DT has been tested not only in IT and IS but in other fields of human diversity such as individual adoptions. DT have three components (adopters' characteristics, innovations characteristics and innovation-decision process). The component for innovation characteristics is broken down into five constructs, thus (compatibility, trialability, complexity, relative advantage and observability). The study considered three of such constructs; trialability, observability, and compatibility. Moore and Benbasat (1991,101) expanded as well as modified Rogers' model to create a measurement tool for a wide range of information systems and technologies research while also being flexible enough to access a wide range of innovation perspectives. To be compatible with Davis's (1989,52) TAM, the researcher preserved the fundamental terminology of relative advantage, compatibility, trialability and complexity with ease of use. This construct of DT was adopted by Dash et al., (1970,102) in their study on determinants of customer adoption. These were also used by Ramavhona and Mokwena, (2016,103) in their study's. The factors mentioned in the study of Kapoor et al., (2013,104) the adoption of financial digital transactions are influenced by technology characteristics such as compatibility, relative advantage as well as complexity. According to Gounaris and Koritos, (2008,105), just three components of DT thus;

compatibility, relative advantage, and trialability are deemed useful in determining users adoption of online financial transactions. This influence the choice of the construct used by Ajam and Nor,(2013,106) in using the DT model in their study. According to the findings of the study of Lin, (2011,107), attitude is influenced by the ease of use, relative advantage, compatibility, and integrity, which eventually translates into behavioural intent to utilize mobile money. So was the study of Syahadiyanti and Subriadi, (2018,108). In employing financial transactions, the innovative characteristics are determined by relative advantages, compatibility, and trialability.

It was based on the literature discussed that informed the researchers to use the construct adopted by this study. There are well-adopted constructs of DT, thus compatibility, relative advantage and complexity. However, the argument of this study is to enhance the known used construct of DT and explore with other less used ones in the exploration of factors impacting mobile money adoption as may be the case in Ghana. Hence the choice of use of trialability, complexity and compatibility of the DT model.

a. The trialability of mobile money banking ecology

Mobile money banking which started with other mobile network companies in Ghana did not go well and collapsed eventually(109). One such reason which led to that poor performance was the less involvement of users in the trial period; so the question is how much users' involvement will make the system not fail or succeed. The impact of trialability on the user's choice and the decision has been varied. Some studies have shown that trialability is among the most significant ingredients in the innovation diffusion process to enhance user adoption or acceptance of a product or service (110,111,112,113,114,115).

The factor of trialability has also been associated with fields of study which strongly suggest that trialability has an impact in other fields. However, trialability has failed to influence subjects to adopt technology where trialability has been deployed on small samples or trial sizes before adoption (116). Trialability has a tremendous impact on adoption when combined with other factors such as perceived ease of use and perceived usefulness.

b. Users' compatibility with mobile money banking services

The capacity of an individual to undertake as well as incorporate mobile money banking services into their present technology with ease and without distress will eventually compel the user to be associated with such technology(117). Compatibility is viewed in two forms, normative and operational. The normative which is also referred to as cognitive considers the users thought and understanding about that innovation. The operational, at times also referred to as practical, considers how the user relates to the technology in resolving their current task. A user always looks to use and be associated with technology to make their life comfortable and not lose themselves to such technology.

The mobile money technology ecology is complex and the user is not interested in complex setups; they simply want to get involved in the environment to ensure their comfort, less cost, and fewer security

settings but these must be effective. So when the system is right in such an instance, the user adaptation is much faster and easier.

c. A users' observability of mobile money banking

User observability has to do with the use of the technology; these are mostly related to asking a question and inquiring to know the use of that technology. This is done to understand the system and appreciate the value such technology could add to their existing and normal daily financial transaction routine without any hassle. The principle of observability has been related to influencing users in the adoption of technology. The observability relatively determined the adoption of technology which includes mobile money banking systems (118,119,120,121). According to Taherdoost (2018,122), he classified observability into two; visibility and result demonstrability. This is also suggested by Wang et al. (2018,123) who suggested that accessibility influences users' desire to adopt that service or technology. Most users or newcomers discuss with close associates and friends about such technology in a view to getting the assurance of the safety of the user. The reliability of such information does influence such users in getting on to use the technology.

There is one fundamental principle that must not be overlooked to construe observability and adoption, which is that, when users have some uncertainty of understanding or lack of experiment of use of that technology or services in any form such risk could negatively affect the adoption of that service or technology (124,125).

d. Social influence toward behavioural intention to use of mobile money banking services

The association between social influence and diffusion of innovation theory has a long derivative narration starting from Tarde's (1890,126) theory of imitation to Ryan and Gross's (1943,127) diffusion of hybrid seeds. These led to a more scientific theory by Rogers (1962,128) on diffusion theory of innovation. According to Butera and Mugny (2001,129), social influence explains whenever user engages with other people and organisations, how they learn or modify their attitudes, knowledge, and behaviours. The study of James and Jeffrey (2018,130) on the diffusion of innovations theory principles and practices, indicated that innovation diffusion is affected by three main construct variables; social influence, attributes, the larger social and political context.

There have been numerous studies that suggest that social influence is perceived to influence an individual's behavioural intentions to get or consume any new product or service, including mobile money banking(131,132,133) It is perceived that social influence serves as a hiding motivator to influence users in adapting to a technology (134). This has occasion as others see their friends and family adapt to technology. Users see that as a trusted service or technology and risk-free to be associated. This established the notion and reason behind the use of social influence in the adoption of technology. However, some studies contributed contrary to the fact that social influence does not suggest influence other users to decide to adopt (Basri, 2018)

3. Research Methodology

Research methods focus on the process used to collect data to make decisions and evaluate the outcome of the research objective. According to Creswell and Creswell (2018,135), research must have a general framework that aids in the design and structure of the research strategy. As a result, the study used a mixed technique (qualitative and quantitative methods). This was translated into suitable data collection and analysis strategies used. The following section considered each of the research methods in detail. With this backdrop, the study aims to identify and address the issues that drive the expansion of mobile money services in Ghana. The research will use statistical product and service solutions (SPSS) in organising the data collected for this study, then analyse the data using SmartPLS of the structural equation model (SEM)

3.1 Research approach

The researchers first had a panel discussion with experts in the mobile money banking industry, these included professionals who had once worked with the banking industry and the Telcos, and also users with brute force attack experience in the mobile money services. As indicated earlier, most banks and Telco operators were not cooperating in giving out information on their operations. However, the research team was able to meet the mobile operators and agents in their capacity and not the institution. They shared some insight into the operations of the company they are working for (Vodaphone, MTN, and AirtelTigo). However, Tigo and Airtel have been incorporated as AirtelTigo. Most of the information from these agents and operators was corroborated by the expert contacted for this research. Also, the researchers own experience in the usage of the system was a great contributing factor in the outcomes of this section. Again, this was coupled with a structured survey questionnaire, which was administered to users of mobile money banking services across the country. The research Fig. 1.2, which is the workflow give much details and steps to the research approach designed for this study.

3.2 Data Collection Methods

The number of people from whom the data was collected was based on scientific consideration and following due diligence in arriving at the sample size. The targeted population for the study is the total active registered users of mobile money banking users in Ghana. The total active users of mobile money banking as of 2019 stood at 14.5 million across the sixteen (16) regions in Ghana (8)

The researchers contracted seventeen (17) personnel with an academic background ranging from Certificate A and Higher national diploma (HND) in Ghana. The researcher's organised a training session with them and piloted the test of the data collection before collecting the main data for this research. The survey questionnaire was administered at the various mobile money banking agents venues (where users who came to patronize the services of the agent). Again the researchers were involved in the data collection.

The formula used by Taherdoost (2017,136), $n = \frac{p(100-p)\,z^2}{E^2}$ combined with Uttley (2019,137) sample size regime was used to determine the sample size from the population for this study. There are a couple

of reasons associated with accepting this formula; first, it is simple to use to determine sample size from known population size. It helps in estimating the accuracy and risk that perhaps the study is prepared to take. Finally, it gives room for estimating the demographics' variation or heterogeneity of the population who are going to respond to the survey.

The parameters used in the formula indicated that (E, is the recommended highest percentage deviation; p, the proportion incidence of material under the influence; Z, this corresponds to the desired degree of assurance needed; n, the needed sample size). The margin of error considered was 2%, the basic assumption of that percentage is that when a population is sampled many times, the mean value of each variable or question acquired will equal the overall population estimate. Moreover, this margin of error could be varied from 1–5%, the decision of choice lies on the reliability and significance of data associated with the study (138) The confidence level being 95% with which the study was purge; the reason being, it gives the statistical population significance value within the stated error range (E) for the study given it the reliability and precision for the sample size (139). The population variance of 50% was used, according to Bartlett et al. (2001,140) that ensures the variation of the population is maximised, as well as the sample size is increased. A population of 14.5 million users of mobile money banking as stated earlier in this paper was the base.

The sample size determined from the formula stood at 2,401. The data collected were sorted out to meet the required standard. The following questionnaire was excluded as a result of their deficiency to support the research outcomes, thus; some questionnaire responses were changed more than once; 57 of such were detected and were rejected. There were 46 missing data in the questionnaire. The valid questionnaire used for the analysis was 2,298 after all the incorrect copies were removed, thus representing a 95.7% valid response rate of data collected.

4 Result And Analysis

The analysis was performed using the SmartPLS data analysis tools of SEM. There are two main constructs of variables for the subject test element considered, endogenous and exogenous variables (148). The exogenous variables used for the study were set from TAM and DT, with some additional constructs from the researchers. The TAM exogenous factors considered are "perceived ease of use, perceived cost, perceived trust, social influence, perceived usefulness and perceived risk". The DT exogenous factors considered are observability, trialability, and compatibility. The exogenous factors introduced by the researcher is government policy and security. The endogenous factors associated with the study are attitude toward using mobile money, behavioural intentions to use, and actual use of mobile money.

The analysis of the data using SmartPLS was based on the following: first, construct validity and reliability (Cronbach's Alpha, AVE, composite reliability, and rho A), R-Square, f-Square, Discriminant validity ("Fornel-Larcker criterion, and Heterotrait-Monotrait Ratio (HTMT"), R-Square, f-Square Collinearity statistics (VIF) and Model Fit.

a. Discriminant validity

i. Fornel-Larcker criterion and Heterotrait-Monotrait Ratio (HTMT)

The HTMT ratio is calculated by dividing the geometric mean of heterotrait-heteromethod correlations by the average of monotrait-heteromethod correlations. Henseler et al.,(2015,141) claim that discriminant validity between such a pair of reflective constructs has indeed been demonstrated to be available if the HTMT value is less than 0.90. The HTMT must be between the confidence interval of -1 and 1 for a good measure of discriminant validity (142).

ii. R-Square,

The total effect magnitude measurement for the conceptual framework is R- Square. The normal measure applies R-square to every variable in the model, allowing integration to be tested for both the measurements for the outer loading and structural models. The incremental R-square is regarded in the same way as regression. Model intricacy is evaluated by Adjusted R-square. They (143) classify results cut-offs of 0.67, 0.33, and 0.19 as “substantial,” “moderate,” and “weak.” for the endogenous construct. This’s demonstrated in Table 8, as shown here.

iii. f-Square

The f-square (f^2) simply evaluates the impact of exogenous constructs on endogenous constructs that show the relevance and the path (144, 145, 146, 147).

iv. Collinearity statistics (VIF)

Whenever the tolerance coefficient is below .25, multicollinearity is detected using VIF, which is really the reverse of a tolerances coefficient. The systemic VIF coefficients really shouldn't exceed 4.0 in a very well acceptable model (148). The study VIF is shown her in Table 7.

v. Model Fit

As a means of contrasting models, GoF is used to identify whether a theory is well-fitted or poorly-fitted, and to also identify measurement and structural model measurement error (149). According to Henseler et al, (2016) the relatively low the SRMR, the stronger the model's fit. Whenever SRMR is zero, a precise fit is established. An SRMR of 0.08 or less is appropriate a value greater than 0.08 indicates that there is no fit. Exact fit criterion, the comparatively low the dULS, the higher quality the fit of the framework, which also applies to the outcome of dG. This is well demonstrated in the study model in Table 6, as shown here.

b. Reliability

The reliability of the research takes into consideration the consistency of the study outcome over a while. One section looked at when discussing the reliability of research is internal consistency which considers

the level or degree at which the variable set for the study behave the same way when the study is repeated with the same variable is given the same environment. The use of SEM through SmartPLS to measure the reliability of data. Some areas should be of interest to the researcher; this includes the composite reliability, average variance, squared multiple correlations and construct reliability.

The T-values and P-values are used to evaluate the quality attributes in the AVE. AVE can be used as both a convergent and a divergent validity test. AVE is the quantification of its squared loadings of the parameters; it also takes into consideration the variance loading of both an attribute and its related measurement outcomes, which should be upwards of 0.5 (150, 151). Whenever the AVE value is less than 0.5, it indicates that there is a possibility of missing values or errors in the data, with a probability greater than the AVE. As a result, AVE greater than or equal to 0.5 is appropriate to be regarded as suited for the desired objective. AVE determines the current connectedness for each latent construct in a reflective model. The AVE should be greater than .50 (152). The correlation matrix, representing AVE's square roots, is another measure of the discriminant validity. Composite reliability is the best way to determine convergent validity in a reflective model. The composite reliability scale ranges from 0 to 1, with 1 being the most reliable. In a framework suitable for exploration studies, composite reliabilities should be equal to or greater than.6 (143). A score of.80 or higher is considered a strong simulation conclusion for confirmatory studies (153). Cronbach's alpha also takes into account whether latent variable coefficients have convergent validity and are thus reliable. A given return of Cronbach's alpha of .70 as the final result for a scale that is acceptable for confirmatory study and .60 for exploratory research on a scale of one to ten. The rho-A parameter is said to determine whether the model structure construct performances are consistent. A rho-A measurement scale of 0.7 or higher is required to establish composite reliability. Meanwhile, a rho- A value greater than one is out of the ordinary, and thus should be avoided in the model.

5 Data Analysis On The Research Proposition

This section considers the research proposition set for the study and how that relates to the data gathered and its effects on the proposition, with consideration from Figure 1.3 of the research model.

5.1 Factors that influence mobile money adoption in Ghana from the research proposition.

The purpose of this part is to go over the elements that drive mobile money banking usage in Ghana again. According to the literature, the factors ascribed to users embracing mobile money varied by country and, on the other hand, differ between developed and emerging nations. As in the context of Ghana, the narrative may be similar to that of other jurisdictions that have relied on mobile money and banking services.

5.2 The perspective from TAM

a. The attitude of users has an impact on their behavioural intention to use mobile money banking

The bell shape influence of congruent factor led to how one's attitude had influenced their desire to use mobile banking. The investigation set five questions to determine how this influence users behaviours. The questions attribute are AT1, AT2, AT3, AT4, and AT5. The outer loading for AT3 was the only construct factor that did not show it was reliable to use. According to Henseler et al., (2012,153), outer loadings should be above .70 and those that are below that should be dropped to improve the reliability of the latent variables (154). In the case of this study, all loading below .70 was maintained for transparency of the variable used and the general outcomes for the study. The analysed data representation shows that each of the variables influenced users' behaviour, the data representation is .94 for AT1, .88 for AT2, .95 for AT4, .87 for AT3 and finally, the least came from AT5 which was.68 using Table 10. From Table 3, the overall influence of users' attitude to behavioural intentions to use mobile money was .88 which was much significant.

b. The perceptions of perceived risk have an impact on users' attitude towards using mobile money banking

Some questions were asked to solicit information from users to ascertain the veracity of perceived risk about mobile money banking had on their stance on the use of mobile money. The research set out four questions to that effect which are, PR1, PR2, PR3, and PR4. The data reliability, using the outer loadings shows that the construct variables for PR1, PR3 and PR4 are reliable, each representing the .70 required threshold the PR2 had a less significant output of .68 outer loading considering Table 10. On that score, it makes the average estimate and composite reliability obtained fall below the expected range, thus .86 and .61 as shown in Table 3 and Table 2 respectively. This, however, gives the overall outcome of the research proposition to be positive, meaning perceived risk has a beneficial impact mostly on users' attitudes regarding adoption. This does not confirm the findings made by other studies such as Siadat et al., (2019,155).

c. The perceived cost has influenced users' attitudes toward mobile money banking.

This question had three sub-questions asked to determine whether the perceived cost of mobile charges and its related cost had an impact on users' attitudes regarding mobile money banking services. The question was PC1, PC2 and PC3. The related effect of impact to the user by these questions showed there indeed there was a greater favourable influence on the user's decision to use mobile money banking service in Ghana. From Table 10, the outer loadings for all the constructs were highly positive related since each outer loading was more than .70 thus, the specific loadings were .93 for PC1, .87 for PC2 and.94 for PC3, leading to good composite reliability and Cronbach's Alpha o . 94 and .91 apiece as exhibited in Table3 and Table4

d. The perceived trust has an impact on users' attitudes towards mobile money services

The research used to solicit user perception under this had six (6) questions to determine if perceived trust in the mobile money environment affected customers' attitudes regarding mobile money services. The question framed for this purpose were PT1, PT2, PT3, PT4, PT5 and PT6. Generally, the issue of trust

has been a major discussion in the literature and this has shown us the outcome of the data collected. The only variable that had a positive relationship with users on mobile money was PT3 with a data loading representation 83The rest of the variables had challenges on user trust with PT6 showing a negative percentage outer loading of .30 from Table 10. The rest of the indicators outer loadings failed below the reliability threshold of .70 indicating that the latent variables are not reliable. The literature strongly suggests that perceived trust has had issues relating to influencing users in adoption. Furthermore, this was the general confirmation of the assumption that a user's negative perception of technology will lead to their mistrust of that service or technology, throughout mobile money banking service. Around that score, overall average variance derived, since it composite reliability, and Cronbach's Alpha was .20, .12, and.57, respectively, as seen from Tables 2, 3, and 4. This conclusively all reinforced the notion that the perceived trust in mobile money banking in Ghana needs to be addressed by the telecoms and all other actors in the mobile banking business including government legislation.

e. The perceived usefulness has an impact on a user's attitude towards mobile money services

There are six questions set to determine how perceived usefulness had an impact on users' attitudes towards using mobile money banking services in Ghana. The data analysis was based on these questions, PEU1, PEU2, PEU3, PEU4, PEU5 and PEU6. The analysed data showed that most of the variables are perceived to influence users' attitudes positively. The data trend shows that each of the variables had some factors outer loading which fared poorly. Using the best standard threshold of .70 for a positive measure, these construct variables of PEU1, PEU2 and PEU5 were not significant with the outer model loading of .87, .91 and .87 respectively using Table 10. However, on the flip side of the same construct for the same latent variable of perceived usefulness, their outer model loading was positive meeting the positive threshold of .70. These shaved the composite reliability of the perceived usefulness latent to .87 as represented in Table 3. The outcome is supported by the literature and has confirmed the research proposition, that positive perceived usefulness influences users’ attitude to using technology.

f. The perceived ease of use has an impact on users’ attitudes toward the use of mobile money services

There are five sets of questions to determine how perceived ease of use of a system, in this case, mobile money banking, had an impact on users' attitudes to use mobile money services in Ghana. The questions were PEOU1, PEOU2, PEOU3, PEOU4 and PEOU5. The outer loading and the overall composite reliability of the research proposition were positive. The outer loading for all the constructs was more than the standard performance level of .70 showing a positive significance loading to the latent variable. Each of the construct outer model loadings was all above .70 for PEOU1 to PEOU5 as presented in Table 10. As a result of the significance of all the outer loading, this has improved the composite reliability with an outcome of .88 presented in Table 3. This demonstrated that customers' attitudes about mobile money in Ghana were influenced by the latent variable of the study proposition of perceived ease of use.

5.3 The perspective from DT

a. A users’ compatibility has an impact on users’ attitude to use mobile money services

To determine how users' compatibility with users' mobile money had an impact on their attitude to use mobile money services, the research set four questions under this section to determine that these were COM1, COM2, COM3 and COM4. The total impact of each of the variables set under this category showed that the overall impact of this question was significant apart from COM1 which did not meet the threshold of .70 for a significant outer model loading as shown in Table 10. The rest of the construct showed much positive impact of .82 for COM2, .80 for COM3 and .72 for COM4. The level at which these factors had an impact on the overall attitude of the user to use mobile money services was .84 using the composite reliability each for that latent of compatibility was much significant as indicated in Table 3.

b. A users' observability has an impact on user attitude to the use of mobile money services

There are four questions from the research to achieve this. These are OB1, OB2, OB3, and OB4, each of the factors showed that observability was an important measure in mobile money banking usage to have an impact on the attitude of users to use mobile money services. The level of impact using the outer model loading was very significant. From figure 1.3 and Table 10 the outer model for OB1 was .78 then .86 for OB2, .88 for OB3 and .78 for OB4. Using both composite reliability and Cronbach's Alpha, the overall impact on users' attitudes about mobile money banking in Ghana was positive. They both score more than the reliability point required. The corresponding outcomes were 70. Using Tables 3 and 4, around this order, the composite dependability was .90 and Cronbach's Alpha was.85

c. The trialability has an impact on the attitude of a user in using mobile money banking services

Three research questions were set to determine how trialability by a user in the determination of interest to decide on a choice of technology or a system was as in the mobile money banking in Ghana. These questions for trialability are TR1, TR2 and TR3. In the literature, the deposition that a user has had some trialability session before the actual use of the service was not significant. However, the little experience of individual users about mobile money banking services grew over time from individual users' experience of trials of the service. Given that, the outer loading for all constructs set met the significant threshold of .70 for all the questions considering Table 10. The composite reliability of the user trialability to influence their attitude to use mobile money banking service was positive representing .90 from Table 3 which was supported by the literature.

d. Social influence has an impact on users' attitudes toward the use of mobile money services

The social influence of an individual or a group of people must have influenced others' attitudes toward using mobile money financial services. The study included three questions to help answer the extent to which social influence altered users' attitudes about adopting technology and services. These questions were set as SI1, SI2 and SI3 each with data outer loading analysis representation of .79, 92, and .93 respectively as presented in Table 10. The analysed data outcome from the data collected showed that certainly, the latent variables of social influence had influenced users in their choice of use, in this case, mobile money banking service in Ghana. This equally indicated that it had an overall

outcome to impact one's attitude, using the composite reliability outcome of .91 from Table 3 had shown that social influence influenced users' attitude to adopt technology and its related services.

6. Research Findings

The research findings is summarise in Table 6.1 as shown in the table.

Table 6.1
Summarise research model findings from TAM/DT

Research proposition	Determination
Users' attitudes toward mobile money banking affect their behavioural intention utilising mobile banking services.	Supported
The perceptions of perceived risk about mobile banking ecology have an impact on user attitude towards using the mobile banking services.	Supported
The perceived cost of mobile banking has an impact on users' attitudes towards the use of mobile banking services.	Supported
The perceived trust in the mobile banking ecology has an impact on their attitude towards using mobile banking services.	Not supported
The perceived usefulness of a mobile money service influences a users attitude towards mobile money service.	Supported
The attitude regarding the use of mobile money services is influenced by the perceived ease of use of mobile money services.	Supported
A user's compatibility with mobile money services influences their willingness to utilise mobile money banking services.	Supported
Users' attitudes about mobile money banking services are influenced by social influence.	Supported
The observability of a user's mobile money banking ecology has an effect on the user's attitude toward the use of mobile money banking services.	Supported
The trialability of mobile money banking ecology influences user attitudes toward mobile money banking services.	Supported

7. Contribution Of Research To The Model

The results of the study on the use of research models for academic purposes have been found to impact technology adoption. The use of TAM with modification has been used and there are sufficient studies on this (156, 157, 158, 159, 160, 161, 162, 163); in the case of Dumpit and Fernandez (2017,164), using TAM relating to social media analysis in high education. According to the findings, perceived ease of use and usefulness influence student usage behaviour (165, 166, 167, 168, 169). This was consistent with the findings of Weng et al. (2018,170) on the use of multimedia by teachers. In the case of mobile banking and money, there are equally sufficient studies (171, 172, 173, 174, 175, 176) with equal outcomes on

how the construct in TAM has been used to determine the acceptance of the scope of study related to its influence in the adoption of technology (177). The direct implication of other studies using both TAM and DT in the areas of mobile money and mobile money has shown to be directly connected to the outcome made from this study. In the case of Muñoz-Leiva et al. (2017,178), their study indicated that attitude is intrinsic in the determination to use in the subject of technology, specifically mobile applications. This is supported by Chawla and Joshi (2018,179), considering the demographic variables on mobile money.

8 Discussion And Conclusion

The usage of the conceptual model with both TAM and DT constructs to determine their influence on mobile money financial services adoption has proven to be successful. Overall outcomes of the study back up Venkatesh and Davis's (2000) premise that social influence, perceived usefulness, and other associated factors influence individuals' decisions to adopt or reject a new system. Even though there were other new constructs introduced by the researchers, the principal ideals of TAM were still confirmed. According to Venkatesh and Davis, perceived usefulness also influence one's usage intentions leading to actual usage, this was supported by the outcome made in this study. The construct adopted for the study from DT were all found to be appropriate and confirmed what has been done in other fields of studies, supporting the proposition posited by the study in the model. Users of mobile money banking services have observed how compatible it is with existing ways of financial transaction, which has changed their attitude and behaviour, contributing to their real acceptance of mobile money in Ghana. It was indeed similar to the basis for the use of compatibility, observability, and trialability. Individuals' actual use of service or technology is influenced by these DT conceptions (180, 181, 182, 183, 184). Except for the construct of perceived trust, which had a composite reliability sample value of.004 and a P-value of 0.809, all of the TAM variables were supported. There is enough evidence to suggest perceived usefulness (185), perceived cost (186), perceived trust (187, 188, 189), and perceived risk (190), have influenced individual attitude towards the adoption of mobile money banking (191, 192). According to Singh and Sinha (2020,193), the perceived trust had a minor impact on perceived utility; yet, it was able to influence user intention to use mobile wallets. According to the findings of the study, perceived ease of use influenced users' attitudes about utilizing mobile money services, which in turn influenced their behavioural intentions to use mobile money banking services, which led to their actual adoption of the mobile money service in Ghana. It was also discovered that perceived ease of use directly influences behavioural intentions without necessarily relying on their attitude, implying that the majority of users of mobile money services adopted the services as a result of how convenient the application had made their daily financial transactions. However, there was some discrepancy in the report findings by Hu et al., (2019,194), which stated that perceived risk is one of the most important factors influencing adoption, which contradicted the conclusions of this study. Furthermore, the expert debate strongly advised that the government should assist telcos in sanitizing the system from perceived risk and trust issues. They proposed that, as a matter of urgency, the government re-register all SIM cards used in Ghana, and that the government again monitor the actions of the telcos, including mobile money banking, by enacting the

relevant legislation. This is supported by the results of the construct encased by the model, as shown in Tables 3, 4, 5, and 6.

The response to the research question and the study outcome.

1. What are the elements impacting mobile money banking in Ghana?
2. What effect do these variables have on the financial ecology of mobile money?

The study's findings are summarized in Table 3, which is organized according to the model theories employed. TAM and DT are the theoretical models. According to the research, several of the TAM factors such as perceived cost, social influence, perceived usefulness, and perceived ease of use are significant factors influencing mobile money banking in Ghana. Again, compatibility, observability, and trialability are variables examined under the DT for the investigation. The study's findings revealed that all of the parameters addressed under DT had an impact on consumers' adoption of mobile money banking in Ghana. In response to the first question posed prior to the study, the study found that perceived cost, social influence, perceived usefulness, perceived ease of use, compatibility, observability, and trialability are factors that have strongly influenced mobile money users' acceptance in the financial inclusion industry. Finally, these findings will go a long way toward assisting stakeholders in making any decision toward improving the mobile industry, and they should consider some of these variables in their decision.

8. Future Work

According to the study's findings, technology models such as TAM and DT forecast growth in digital financial services in Ghana. This provides stakeholders with a point of reference in their efforts to improve mobile money banking services, as well as the areas of focus as the research framework provides significant impetus on the subject. The application of TAM and DT has made a significant contribution to technological advancement in the determination of the adoption of technology services. This also demonstrates that TAM and DT can be accessed for modelling with other constructs as long as their input is used to help decide on a certain subject. The needs of mobile money banking users have been expressed, indicating that telecoms must work together to strengthen the exponential growth gain in the digital finance business. In the suggested model, the users' factors of consideration in the adoption of mobile money have been demonstrated to depend on eight primary components from known scientific parameters. More research should be done to evaluate the functioning of the research construct on behavioural intention and actual technology adoption, according to the researchers. Another study might be conducted to investigate why perceived trust was not proven to have support for adoption, as well as the element of perceived risk, which revealed a lack of significant support for users' adoption of mobile money banking in the digital money ecology. Finally, future research could concentrate on employing all constructs under each model with the general population of mobile money banking customers across the country.

Declarations

Competing interests: The authors declare no competing interests.

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340.

Tables 2-10

Tables 2-10 are available in the Supplementary Files section.

Figures

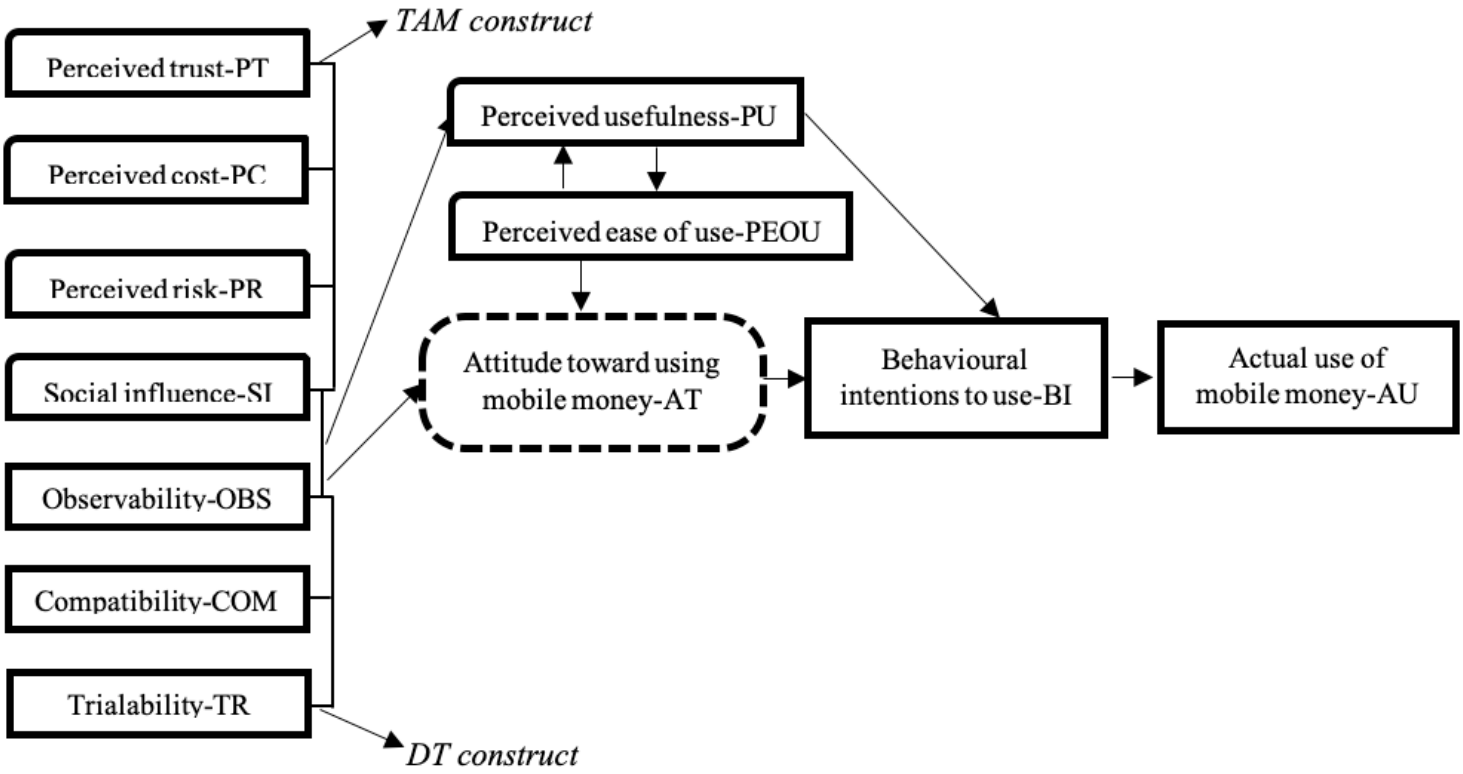

Figure 1

1.1: Research model for study

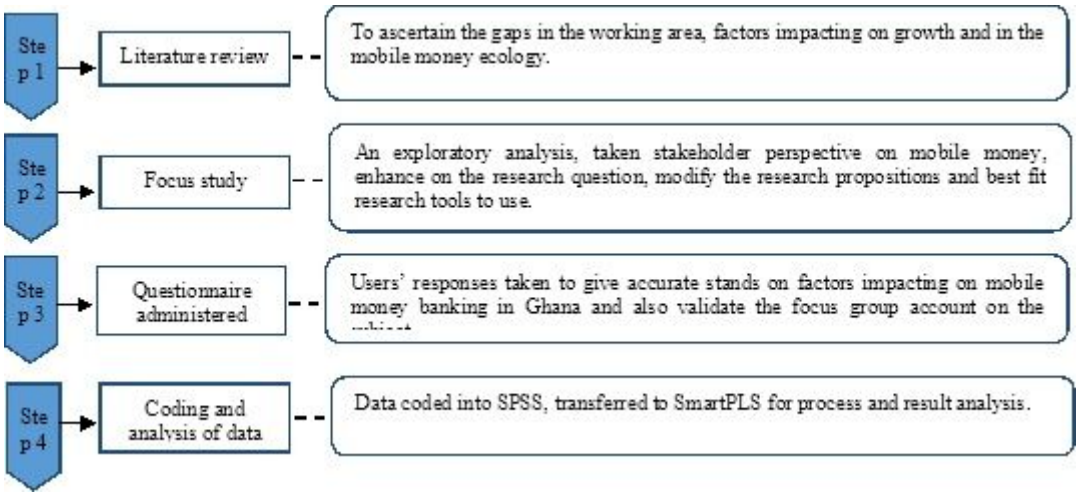

Figure 2

1.2: Research workflow

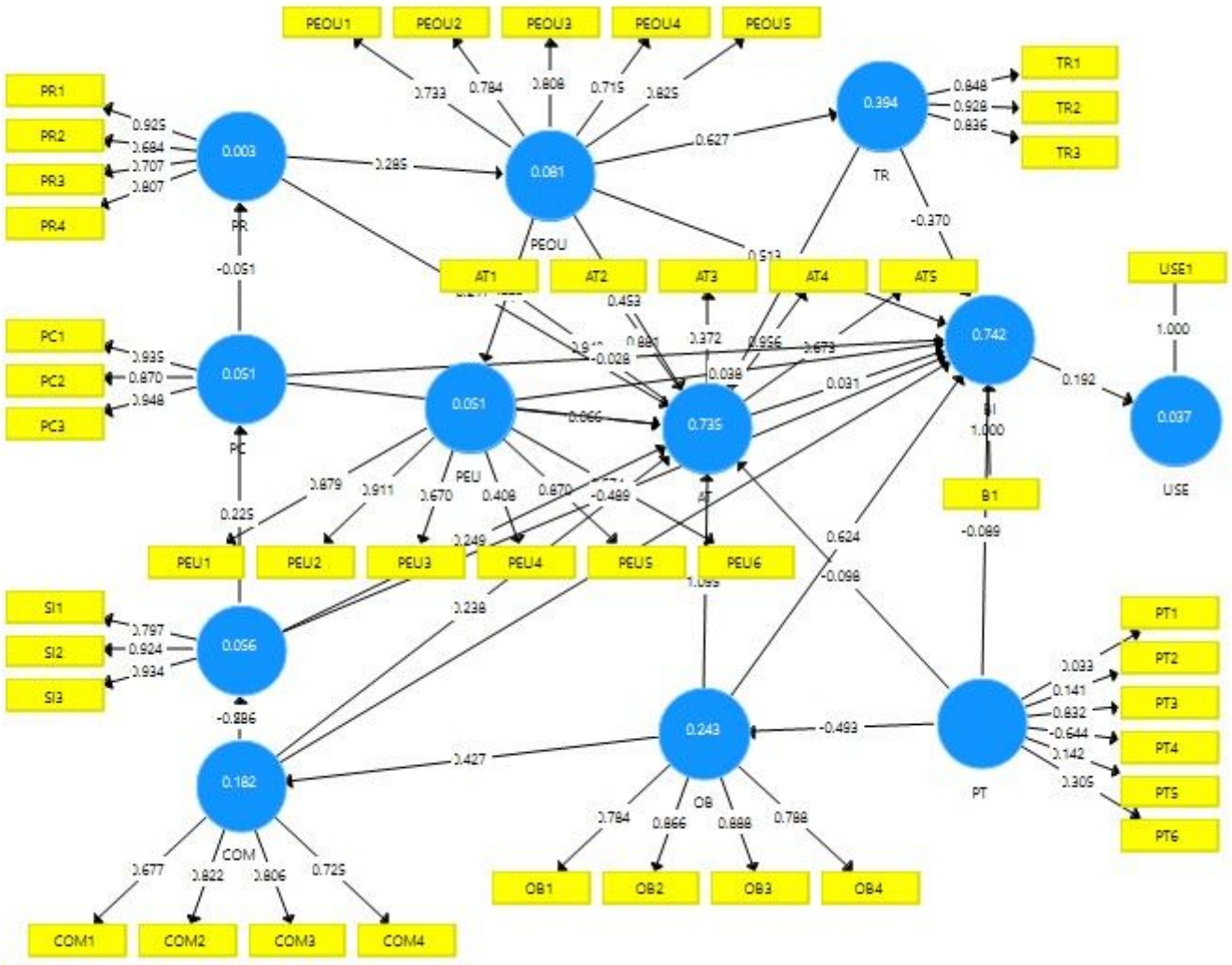

Figure 3

1.3: Figures used

Supplementary Files

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- ResearchTables.docx