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# Factors Influencing the Adoption of Digital Wallet: Evidence from Ghana

Ofosu Amofah<sup>1,\*</sup>, Otopah Akuffo Alex<sup>1</sup>, Collins Kankam Kwarteng<sup>2</sup>, Ahlijah Bright<sup>1</sup>, Simon Kwodjo Mesa Avorgah<sup>1</sup>

<sup>1</sup>Marketing Department, Ho Technical University, Ho, Ghana

<sup>2</sup>Marketing Department, Kumasi Technical University, Kumasi, Ghana

## Email address:

amofahofosu@gmail.com (Ofosu Amofah), oaakuffo@gmail.com (Otopah Akuffo Alex), kolkann@gmail.com (Collins Kankam Kwarteng), bahlijah@htu.edu.gh (Ahlijah Bright), savorgah@htu.edu.gh (Simon Kwodjo Mesa Avorgah)

\*Corresponding author

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**Abstract:** The increasing demand for virtual banking transactions in the world amidst the global COVID-19 pandemic has necessitated the need for banks to understand factors that influence the adoption of digital wallets. This study therefore focused on the assessment of the factors that influence the adoption of digital wallet in Ghana. The study employed a survey design and data were gathered from 200 individual customers of the top performing banks in terms of digital wallets. Convenient sampling method was used for the selection of the respondents who were willing and ready to participate. Partial least squares structural equation modeling (PLS-SEM) was employed for the analysis of the data. The study revealed that innovation characteristics, individual customer characteristics, organizational characteristics and external factors had significant effect on adoption. All the independent variables except individual customer characteristics had a positive effect on adoption. It is therefore recommended that management pays much commitment on understanding their innovation characteristics, organizational characteristics and external factors than the understanding of individual customer characteristics. The researchers obtained data from individual customers of the top performing banks in the area of digital wallet. The cross-sectional survey made it impossible to ascertain the possible changes in respondent's perceptions on factors that influence their adoption.

**Keywords:** Adoption, Digital Innovation, Digital Wallet, PLS-Sem

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## 1. Introduction

The study seeks to investigate non-infrastructure factors (organizational characteristics, individual customer characteristics, innovation characteristics and external factors) that influence consumer adoption of digital wallet as an emerging innovation in Ghana following the outbreak of COVID-19. The Ghanaian economy in recent times has experienced a surge in the usage of e-wallets accounting for 100% from the first quarter to the fourth quarter in 2020 [3]. The digital economy has become indispensable as a result of consumers demand for a cashless system as demonstrated in the statistics above. This has created burden on organisations especially the financial institutions to meet electronic

payments demands. A study by [42] centered on how supporting infrastructure impacts on the digital innovations adoptions. [52] argued that there is sufficient evidence on digital infrastructure in support of digital innovation adoption. This suggests further study that focused on non-infrastructure issues such as innovation characteristics, personal factors, organizational characteristics, and external influences on the adoption of digital innovation [51].

Previous studies have documented greater consumer resistance of digital innovations in less developed economies than developed world [16]. Despite resistance is directly opposite to adoption theory and have similar theoretical significance, much attention has not been paid by researchers in the less developed economies like Ghana. This leaves much

to be worried about and makes the current study timely [12]. The understanding of external, personal factors, organizational characteristics, and innovation characteristics has been confirmed by [24] as integral in digital innovation planning. These factors were considered relevant in the adoption of products [34, 38] digital TV [28]; services [28, 11] health sector [38, 40]. Irrespective of growing significance and contributions of the digital wallet to the Ghanaian economy as well as the importance of individual customer characteristics, organizational characteristics, innovation characteristics and external factors less empirical evidence exists between them [37]. Even though a number of studies have focused on factors that influence digital innovations in developed and developing economies [34, 9]. [32] specific emphasis on e-wallet in the Ghanaian context is missing. Again, current empirical studies on the subject matter failed to employ Partial Least Squared-Structural Equation Modeling as a statistical tool for analysis which the current study seeks to consider.

The study seeks to offer an alternative methodological approach in examining factors influencing the adoption of digital wallets in the Ghanaian context. This gap of knowledge makes this an important area worth investigation by researchers who are interested in adoption of digital wallet in Ghana. In addition to the fact that the consumers adoption is the real and ultimate reason for firms investment in digital innovations [56, 28], and requires substantial empirical evidence from both developed and developing world to aid all firms equal opportunity on what matters to consumers in both developing and developed world in their acquisition of digital innovations as alluded by [4] provides enough justification for this study.

The findings of this research contributes to the existing literature on adoption of digital innovation in general, but more specifically to the literature and readers understanding on factors that influence the adoption of digital wallet in Ghana. Practically, the findings will inform financial institutions, central banks, policy makers on their strategic decisions with regards to digitalization of payments systems holistically. The findings will enable financial institutions, retail businesses and other business organisations in making decisions with regards to the digital wallet as a payment option.

In the remaining parts of the paper, we begin to review underpinning literature of our study. Followed by conceptual model and hypothesis development. This was followed by methodology, results and analysis, discussion and conclusion, theoretical and managerial implications of the findings. Finally, limitations and future research directions.

## 2. The Concept of Digital Innovation and Adoption

Continuously, firm's commitment on investing and developing digital innovations is on the increase [12; 21]. According to [31] digital innovations are internet-enabled

service innovations including digital wallet. Adoption of digital innovation can therefore be termed as the decision of consumers to change their status quo and consider using internet-enabled service innovations [27, 28]. The way of living has been changed, thanks to digital innovations which have revolutionized business-customer interactions. Interestingly, literature on product and service innovation adoption has been established long ago in the field of marketing e.g. [29, 49]. However, limited attention has been committed to digital services and its associated factors significant to consumers. [41] seminal research has since instigated further research into adoption of innovation. Initially, research into adoption was purely in marketing whilst that of digital innovations was solely in the information system or information communication technology. The increasing demand of customer for stress free and convenience have challenged firms and researchers to investigate into digital innovation adoption [47]. This has made the area universal for scholars including, marketing.

Digital innovations have been characterized with short life span [33], and digital innovations, such as information and communications technology (ICT) applications, have a short shelf life, which requires firms to ensure quick diffusion of their products by overcoming resistance [44, 8]. Due to such characteristics of digital innovations, diffusion and adoption may face greater resistance making it necessary to understand broader factors that can contribute significantly to the adoption rate of such innovations [43].

Diffusion of innovation theory that sought to explain the predictors of innovation adoption by [41] postulate that innovation adoption influenced by relative advantage, compatibility, trialability, observability or communicability and complexity. He further categorized buyers of innovation into five, namely, innovators (2%), early adopters (13.5%), early majority (34%), late majority (34%) and Leggards (16%). This segmentation is based on the time consumers buy the innovation after it has been launched into the market. The existence of a model to explain predicting factors of digital wallet adoption is scarce in the current literature. The study seeks to close the gap in the extent literature on digital innovations and adoption. Among the theories that have also been employed in the previous literatures to explore the adoption of innovations include technology acceptance theory (TAM) [10]. An extension of this theory by [35] to include social influences and personal traits for internet adoption.

In analyzing predicting factors of digital innovations (digital wallet), [54] argued and suggested that four contextual variables that determined customer acceptance of any innovation were innovation characteristics, individual customer characteristics, organization behaviour and external factors. Technology Acceptance Theory (TAM) has less been applied in the context of digital wallets irrespective of its suitability in predicting adoption of digital wallets [9]. The study draws its foundation from theory of innovation diffusion and technology acceptance models. These two theories are relevant to the study as they offer enough understanding on how consumer adopt digital innovations such as e-wallets.

### 3. The Concept of Digital Wallet

Vinayamoorthi, G. and Thirupathi, M. [53] defined digital wallet as an electronic device used to make electronic payments for the exchange of goods, and services. The presence of smartphones and its associated digital infrastructures couple with consumer taste for digitalization has created and sustained digital money economy in the world. Even though cash and cheque payments systems still exists in the world of business especially the developing economies. However, the cost effectiveness of digital money is unmatched especially in this presence era of COVID-19 where social distance and restrictions on movement are prevalent. The development of technology and the advancement of smartphones have become an essential part of the daily life of people today fueling the growth of e-wallet usage by consumers in Ghana. Therefore digital wallet is defined as all forms of electronic payment systems that facilitate online consumer payments of goods and services.

Digital wallets as popularly known as e-wallets stimulate the online buying culture of consumers. This is so because it provides a payment system which does not require physical presence of the exchange agents (seller and buyer) [28]. The existence of digital wallet or digital money is creating convenience in paying for goods and services. However, the opportunities created by digital wallet cannot be sustainable if certain factors that influence its adoption are not considered by the organisations [9]. Therefore the researchers are motivated to investigate this subject matter.

### 4. Factors that Influence Adoption of Digital Wallet

#### 4.1. Innovation Characteristics and Adoption of Digital Wallet

Rogers, E. M. [41] theory of innovation diffusion and adoption explores innovation on the basis of consumers incorporating the new offer into their buying processes. This theory has been utilized to examine innovation adoptions by many scholars [9, 28, 4]. The theory contends five unique characteristics of innovation like digital innovation that influences customers' readiness to try the innovation over the status quo. In the seminal work of [41], five specific characteristics of innovation emerged as distinct factors that influence readiness of consumers to try innovation. They include difficulty of consumers to use the innovation (complexity), the opportunity for consumers to try the new product before adoption (trialability), the consistency of the innovation into the consumers culture (compactibility), the unique benefits of the innovation which cannot be found in the status quo (relative advantage) and the extent to which the innovation is known by consumers through integrated communication strategies (communicability). The safety and privacy nature of the digital innovation can strengthen consumer adoption according to [55]. This argument compliment Rogers's earlier assertion that no consumer will

choose an innovation when the status quo is better than the innovation. However, it was suggested by [2], that out of anxiety, consumers choose an innovation over the status quo. The degree to which digital innovation like the digital wallet can be experimented before making decision on either adopting or rejecting can be of significant effect on consumer adoption [53, 1]. Hence the adoption of digital wallet is more strengthened if the technology can be used free on a limited time at the first time. Trialability therefore has the ability to neutralize consumers' perceived risk of an innovation. [28] contend that innovations have perceived risks of optimal performance, social and cultural rejection as well as psychological risks. [50] further argued that trialability is concerned with innovators and earlier adopters. However, in the study of [55], trialability was significant factor to all categories of buyers of innovation. [13] argued that potential adopter of innovation follows five distinct stages: awareness of the innovation, developing interest, searching for information, trial and finally adoption or rejection. With this argument, it can be contended that poor or lack of effective communication on the innovation will prevent consumer awareness and discovery of the innovation. [55] also postulated that effective communication of the innovation to target market strengthened the success rate of the innovation as there is a significant positive relationship. The easiness and convenience in using the digital innovation guarantees its adoption. The essence of buying an innovative product or service is to use it. Therefore it becomes useless when consumer after buying digital wallet finds it difficult to use. The degree of easiness in using a digital payment system is a key license for its adoption [50].

The adoption of digital wallet such as mobile money involves series of activities including registration, payment or withdrawal procedure, access to customer service. Adoption becomes easier when these processes are user friendly and convenient and vice versa. The link between the digital innovation and the culture of the users is significant for its adoption [41]. This argument has been supported by [36], who contents that resistance of smart products has been attributed to their inconsistency to the culture of the buying segment. This suggest further investigation to either confirm or disconfirm whether this feature of innovation is still significant to determine customer choice of innovation. With the above measurements of digital innovation characteristic, we propose that;

*H1: Digital wallet characteristics influence consumer adoption of digital wallet.*

#### 4.2. Organizational Characteristics and Adoption of Digital Wallet

Wisdom JP et al. [54] posit that organizational relationship and behavioral characteristics also influence customers' readiness to adopt innovation originated from them. The tendency for organizations to create a level of confidence in their innovation guarantee the success of their innovation [41]. Wisdom JP et al. [54] postulated a number of organizational factors that stimulate consumer's readiness to patronize

innovation from their outfit. The factors include the degree of social network established with customers, training programmes for staff and users of the innovation including manuals, desire for change, leadership commitment towards innovation, track records on innovation. The culture and values of an organization defines the commitment towards innovative practices. [36] argued that consumer's readiness to try a digital innovation from an organization much rests on the past performance of the organization's innovation. This is to say that the age of an organization's existence and experience of an organization in the introduction of digital innovation builds a degree of confidence in the innovation. [50] suggested that an organization with a strong social network with customers has greater opportunity to lure them into adoption of their innovation and vice versa.

According to [50] firms with strong culture of innovation and able to move into the market first with innovation has the opportunity to attract more customers into buying the innovation than later entrants. This therefore suggest that the values and customs of an organization that focusses on innovation been digital or not can stimulate strongly the adoption of the innovation. Based on the arguments above, we then propose that:

H2: Organizational behavior and characteristics influence adoption of digital wallet.

#### **4.3. Individual Customer Characteristics and Adoption of Digital Wallet**

According to [4], individual consumer character towards information search and propensity to learn influence their behavior. Individual preferences are mostly linked to their willingness and readiness to search for digital innovation and subsequently adoption [2, 11]. [54] argued that individual consumers of digital innovation share certain features which influences their adoption. Among them include; risk tolerance, experience with innovative products, and consumer's personal association with the organization and their preparedness to change. Risk tolerance is measured based on the ability of the consumer to endure uncertainties and misfortune from the innovation. [29] argued that consumers degree of risk endurance influence their readiness towards innovation adoption. This argument was supported by [4] who argued that risk tolerance is key measure of consumers' readiness to adopt digital innovations. Consumers' level of experience is defined as the number of times or years they have tried an innovative product. Experience is a key recipe to consumers' perceived risks [29]. This experience can minimize anxieties and fear that innovation is complex to use and poses inconveniences. Research on digital innovations has supported the argument that consumers web experience influence their beliefs and values of technology. Moreover, a person with access to computer and internet is likely to have a passion for digital innovations. Consumer who easily use computers and comfortable with technology are likely to use digital wallet. Consumer's acceptance of change is key success factor of a digital innovation and therefore must be considered when measuring their acceptance of a digital innovation. Hence, we

propose that;

H3: Individual customer characteristics influence adoption of digital wallet.

#### **4.4. External Factors and Adoption of Digital Wallet**

Wisdom JP *et al.* [54] defined external factors as the various uncontrollable elements that shapes consumers readiness towards digital innovation adoption. They contend that various factors such as internet and ICT regulations, government policies on digitalization, economic situations, technological growth of the country as well as other environmental issues that influence digital products. The socio-cultural settings as well as demographic variables influence a country's ability to welcome digital innovation. The population density and their level of knowledge in ICT and internet affects the degree of digital innovation adoption. The continuous growth of government interest in digitalization with its policies inform firm's commitment towards investment towards same [29]. This forms the basis for consumers' interest in such digital innovation and subsequently resulting into adoption [30]. Interestingly, these external factors are beyond the control of firms, hence require to take them into considerations when making decisions on digital innovations. This is highly important as innovations that contradict with such external forces failed or rejected after their introduction. According to [50], business risks their investment towards innovation when demographic factors are not considered during the planning stage. This is true because, adoption of digital innovation is influenced by consumer's demographic variables such as education, income, age, and risk tolerance. Hence we propose that;

H4: External factors influence adoption of digital wallet.

## **5. Methods**

### **5.1. Instrument Development**

The study model consisted of five latent variables, each of the variable is measured with multiple items. Each variable was measured with a modified scale from the existing literature with the purpose of strengthening content validity [45]. The wording of the scale items were changed to fit the context of the current study. The questionnaire was initially reviewed by experts in the digital banking and research scholars on the subject matter. This was to remove any ambiguity in the question, to ensure respondent friendly questions and strengthen the construct validity of the items. The feedbacks from the experts were considered in reviewing the questions to strengthening the validity of the questions.

### **5.2. Measurement Instrument**

Innovation characteristics were measured with five items adopted from [54]. The four items used to measure individual customer characteristics were derived from [54]. Organizational characteristics were also measured with items adopted and modified from [54, 50]. External factors was also measured with items derived from [54, 50]. The four items

used for adoption were modified from [36]. All items were measured using 5-point scale that ranged from “Strongly Disagree” (1) to “strongly Agree (5)”. Using this scale, the respondents were asked to indicate their agreements or otherwise with respect to each item statement provided in the questionnaire. Higher scores (4-5) and lower scores (1-3) indicate agreement and disagreement respectively.

### 5.3. Sample and Data Collection

The study employed a cross-sectional survey method for the collection of data over a four week period in May, 2023. In terms of digital innovations, six branches of banks in Ghana ranked higher were considered based on feasibility and suitability to the researchers. Customers in a waiting line in the banking hall and those at the Automated Teller Machine (ATM) were asked if they were active or passive customers of that bank and used any of the digital wallet from the bank. Based on that questionnaires were given to those who responded positively and were ready to participate in our survey. In all, 350 questionnaires were delivered. A total of 255 out of the 350 were administered and returned constituting 72.9% of the total questionnaires delivered. In order to maintain data quality as a result of missing values, a total of 200 valid responses were employed for the analysis.

## 6. Results and Analysis

The study employed SmartPLS software for the analysis of the data. Partial least squares structural equation modeling (PLS-SEM) technique was employed for the analysis of the data after screening. The qualities of SEM enabled causal relationships between latent variables to be tested in the research model [14]. Variance-based approach PLS-SEM was recommended for the analysis mainly due to the non-normality of the data [15]. The researchers used two-step approach to evaluating structural equation model as suggested by [6]. Reliability and validity of the measurement model were initially tested and subsequently tested for the significance of structural path between the latent construct in the proposed model. In testing the reliability and validity of the measurement and structural models, SmartPLS 3 software was employed [15].

*Table 1. Profile of respondents.*

Profile	Measurements	Frequency	Percent
Gender	Male	75	37.5
	Female	125	62.5
Age	18-25	21	10.5
	26-35	35	17.5
	36-45	78	39.0

Profile	Measurements	Frequency	Percent
Education	46-55	55	27.5
	56 and Above	11	5.5
	No formal education	14	7.0
	Formal education	186	93.0
Average Monthly income (GHS)	Below 1000	25	12.5
	1000-1999	67	33.5
	2000-2999	59	29.5
	3000-3999	27	13.5
	4000and above	22	11.0

Notes: n=200

From table 1, it can be found that majority (62.5%) of the respondents were female whilst the remaining 37.5% were males. Majority of the respondents (39.0%) were between the ages 36-45 whilst the least respondents (5.5%) were 56 years and above. Respondents between the ages 26-35 constituted 17.5%; those between the ages 46-55 were 27.5%. Although there were differences between the age categories. However, the differences were not wider as compared to the gender categories. This could be attributed to fewer categories of the gender as compared to the age. Majority of the respondents (93.0%) were formally educated whilst smaller proportion of the respondents (7.0%) were not formerly educated. This pre-supposes that majority of the respondents were able to administer the questionnaires with little or no guidelines. On the average monthly income, majority of the respondents (33.5%) had income between GH¢ (1000-1999) whilst minority of the respondents (11.0%) had income of GH¢4000 and above. Respondents whose average income below 1000 were 12.5%; those with average income between GH¢ (2000-2999) were 29.5% and those with average income between GH¢ (3000- 3999) were 13.5%.

### 6.1. Measurement Model Assessment

The assessment of the measurement model was based on the reliability and convergent validity of the measurement instrument [18]. The assessment of reliability was done using Cronbach's  $\alpha$  and composite reliability. [18] argued that Cronbach's  $\alpha$  and composite reliability must have values greater than 0.7 to be statistically reliable. From Table 2, it is shown that both Cronbach's  $\alpha$  and composite reliability values were above 0.7, hence all constructs were said to be reliable. Average Variance Extracted (AVE) was also used to test convergent validity. For strong convergent validity of the measurement model to exist, the AVE values for each of the construct in the model ought to be greater than 0.5 [18]. See Table 2 as AVEs for all constructs are above 0.5, hence strong convergent validity exists.

*Table 2. Results of Reliability and convergent validity testing.*

	Adoption	External factors	Individual customers	Innovation characteristics	Organizational Characteristics	CA	CR	AVE
A1	0.993					0.991	0.993	0.974
A2	0.974							
A3	0.991							
A4	0.989							
EF1		0.818				0.901	0.939	0.838

	Adoption	External factors	Individual customers	Innovation characteristics	Organizational Characteristics	CA	CR	AVE
EF2		0.965						
EF3		0.955						
IC1			0.875			0.939	0.961	0.891
IC2			0.981					
IC3			0.928					
INC1				0.875		0.953	0.966	0.876
INC2				0.955				
INC3				0.961				
INC4				0.949				
OC1					0.866	0.922	0.945	0.812
OC2					0.873			
OC3					0.965			
OC4					0.897			

Discriminant validity was evaluated using Fornell-Larker criterion, which states that each latent construct's AVE ought to be greater than the highest squared correlated between any other construct [14]. From Table 3, it is evident that the

squared root of the AVEs for each construct is greater than the cross-correlation with other constructs. Hence the measurement model exhibited a positive psychometric properties.

Table 3. Discriminant validity using Fornell-Larcker criterion.

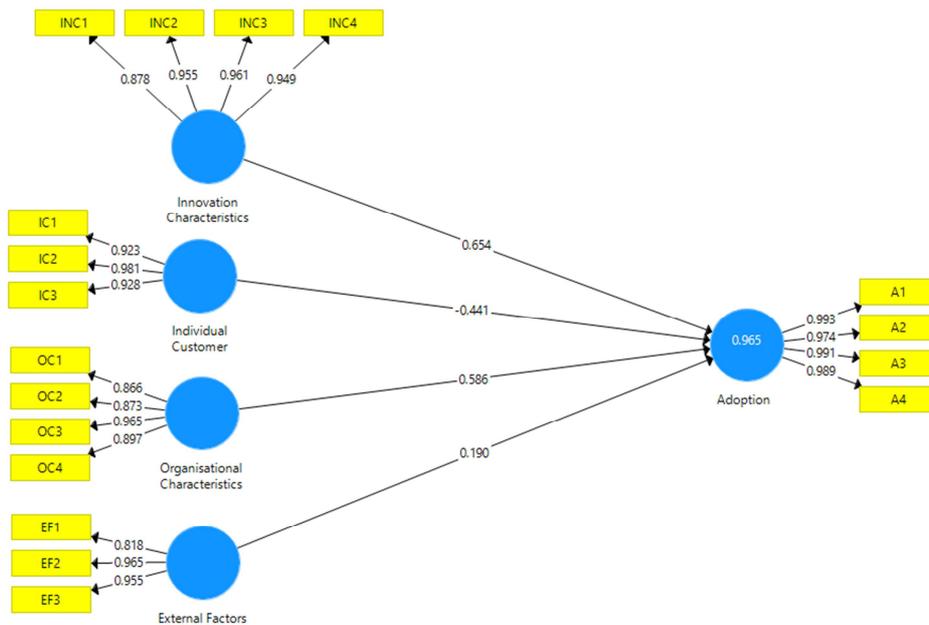
	Adoption	External factors	Individual customer	Innovation characteristics	Organizational characteristics
A	0.987				
EF	0.928	0.915			
IC	0.817	0.773	0.944		
INC	0.895	0.818	0.956	0.936	
OC	0.963	0.929	0.829	0.865	0.901

Note: Square roots of average variance extracted (AVEs) shown on diagonal, while off-diagonals are inter-construct correlations.

6.2. Structural Model Assessment

Following the assessment of the measurement model, we further assess the structural model to establish the meaningfulness or otherwise of the structural relations in the model being tested. In estimating the significance of the path Coefficients in the model, [18] recommends bootstrapping.

Hence a bootstrapping with an iteration of 500 sub-samples drawn with replacements from the original sample of 200 was done. The model power in explaining its ability to predict the outcome of the dependent variable was assessed using the coefficient of determination R<sup>2</sup>. Table 4 and Figure 1 depicts the outcome of the assessment.



Notes: \*p<0.05. \*\*\*p=0.001

Figure 1. Structural model.

**Table 4.** Path coefficients and their significance.

Path	Path Coefficient	T Statistics ( O/STDEV )	P Values	Result
External Factors -> Adoption	0.190	2.925	0.004	Supported
Individual Customer -> Adoption	-0.441	4.404	0.000	Supported
Innovation Characteristics -> Adoption	0.654	5.279	0.000	Supported
Organisational Characteristics -> Adoption	0.586	6.152	0.000	supported

Notes: SRMR=0.071 \*p<0.05. \*\*\*p=0.001

In support of H1 to H4, innovation characteristics was found to have a significant effect on adoption of digital innovation ( $\beta=0.654^{***}$ ,  $p=0.000$ ), Individual customers ( $\beta=-0.441^{***}$ ,  $p=0.000$ ), organizational characteristics ( $\beta=0.586^{***}$ ,  $p=0.000$ ), and external factors ( $\beta=0.190^{***}$ ,  $p=0.004$ ), respectively. External factors was found to be the least significant predictor of adoption of digital innovation ( $\beta=0.190^{***}$ ,  $p=0.004$ ). Lastly, the model fitness was assessed using standardized root mean square residual (SRMR). [20] posit that for a model is fit when SRMR value is less than 0.08. The current model has SRMR value of 0.071 which is below 0.08 threshold, hence the model is termed to be fit.

## 7. Discussion

Given the presence of COVID -19 and government's drive for digitalization in the context of Africa has brought a change in the lifestyle of consumers in all sectors. Among the key sectors affected by this change is the banking sector. In the past, customers in the banking were not much interested to hear of digital innovations specifically digital or mobile wallet as a method of conducting banking transactions. However, with the increasing rate of competition as well as the need for a virtual service delivery, there is a greater commitment on both government and the financial institutions to invest in digital innovations to meet the demands of today customers. In order to increase adoption rate of digital innovations launched, there is greater concern about what influenced adoption of digital innovation (digital wallets). In the context of digital innovation adoption or acceptance, several scholars have contributed to the debate on what really influenced the adoption of such innovations [34, 56, 27, 44] In the context of Africa and Ghana, some scholars have explained adoption based on some variables. In investigating what matters to Ghanaians in the adoption of digital innovation within the Ghanaian banking sector, this study focused on providing empirical evidence to banks in Ghana on factors that determines whether digital innovation will be adopted or not. Furthermore, the study offers rich evidence into the body of literature on customer adoption. All the relationships estimated by the PLS-SEM were all supported.

From the analysis, it can be observed that there is a strong positive significant effect of innovation characteristics on adoption. This suggests that the nature of the digital wallet in terms of its complexity, trialability, communicability and compatibility has a greater influence on its adoption rate in Ghana. This evidence is in agreement with [55, 36, 54, 50].

The results of the analysis above showed a significant

negative effect of individual customer characteristics on the adoption of digital innovation (digital wallet). This presumes that the individual customer characteristics in terms of risk tolerance, experience on innovation, personal association with the bank, and preparedness to change has no influence on their adoption of digital innovation (digital wallet) in Ghana. The findings contradict with [2, 54, 50, 4] who found a positive significant effect of individual customer characteristics on their adoption of innovations. They asserted that digital innovation is characterized with uncertainties, hence individual customers risk tolerance was key to determine customer adoption or otherwise.

As demonstrated from the literature, organizational characteristics have positive and significant effect on adoption [44, 54]. This presupposes that customer's adoption of digital innovations can be triggered by the extant of the banking firm to exhibit a higher commitment towards the success of the digital innovation. It was found that organizational characteristics has a positive significant relationship with adoption of digital wallet. This also suggest that the ability to ensure a reliable and efficient mobile wallet can stimulate the adoption of a particular bank's digital wallet at the expense of others. This also suggests that a savings account holder of a particular bank may opt for digital wallet from another bank if the former has not shown much commitment to digital wallet.

It can also be found from the analysis that there is a positive relationship between external factors and adoption of digital wallets by customers. This is to suggest that, the adoption of digital wallets, sometimes is influenced by government policies and interventions which may be outside the control of the organizations. As established by [34, 54, 50] who argue that digital wallets depends greatly on the availability and convenience of internet and the control of internet are mostly done by the government through an agency.

## 8. Conclusion

It is evident that current findings of the study contrast with similar studies conducted in other parts of the world when investigating factors that influence digital innovation adoption in the banking sector or otherwise. [26], for example, found that the relationship between the dependent variable and these independent variables in this study hold with e-banking from a study in Estonia. Again, [4] concluded that innovativeness positively relates with consumer acceptance of mobile marketing. Perceived risk (individual customer characteristics) negatively relate with adoption of mobile marketing. The implication is that relationship that exist between the independent and dependent variables in this study is not

limited to the Ghanaian context and the banking sector alone but a generalized evidence as shown in [26, 4] studies.

## 9. Theoretical and Managerial Implications

The research offers a very significant contributions to existing theory of adoption. As a further study, it integrates and assess the link between different fashions that has not been previously considered in the present context. It improves our knowledge and understanding of the relationship that exist between innovation characteristics, customer characteristics, organizational characteristics, external factors and the adoption of digital innovation specifically digital wallets in the banking industry in Ghana. With the current study, the existing theoretical gap that seemed to exist among the variables is closed. Furthermore, the study responds to the call made by [22] on world economic outlook which observes a potential growth of digital innovations adoption in Africa in the next decade. This makes it relevant for researchers to expand research into such a promising area of economic development of nations like Ghana.

The findings from the study offers significant implications for managers. Generally, as can be observed from the model, all the variables considered have positive and significant effects on adoption except customer characteristics which showed an inverse relationship with adoption. Over the past years, the banking industry has experienced a period of restructuring and deregulation, there has been fierce competition among the banks for customer acquisition and retention in order to achieve desirable profits. These have pushed bank operators to focus on innovative means of delivering customer service. In view of that it becomes imperative to understand specific factors that stimulates customer adoption of these digital innovations. Therefore, this study is of great benefits to bank operators as it provides empirical evidence to factors that significantly influence customers' adoption of digital wallet. It also provides insights on how adoption is stimulated.

The study further revealed that specific innovation characteristics must be of significant importance to bank operators as they directly influence the decision of customer's choice of adopting digital innovations. This suggest to managers that, any digital innovation introduced must meet acceptable innovation characteristics to be welcomed by adopters. Again, the characteristics of the individual banks (organizational characteristics) has an important effect of the adoption rate of digital innovations. The commitment of management to ensure an efficient and reliable digital wallets positively influence customers' adoption rate. This means that management has to consider their internal issues that may either positively or negatively affect the success of their digital wallets usage. Therefore, bank managers should re-align their core values, systems, structure towards a customer centric digital innovations.

The study also found that external factors has positive and

significant effect on adoption. This reminds managers of the banks on uncontrollable factors which may positively or negatively impact on the success of their digital innovations. This is of great knowledge to bank managers because it reminds them of ensuring of a fit between external environment and innovations. The threats and opportunities pose by the external factors are of significant to bank managers in the formulation of strategies. So, bank managers should have staff responsible for environmental scanning and analysis to identify potential threats or opportunities from the environment.

It was also revealed that, individual customers characteristics was not significant to influence adoption, but has an inversely relationship with adoption. This suggest to managers that limited or no effort should be focused on understanding the characteristics of customers in implementation of digital innovation.

## 10. Limitations and Future Research Directions

Indeed, this study has been able to contribute significantly an empirical evidence to enhance the understanding of digital innovations adoption drivers. However, there are some limitations that are worthy of mention. First of all the adopted model which consists of innovation characteristics, individual customer characteristics, organizational characteristics, external factors and adoption, there are other equally important factors that could have been included in the measurement of the model. So future studies may consider other factors that could be used to measure customer adoption of digital innovations. Moreover, the study considered individual customers of the banks alone which is a subset of the entire customer base. Therefore future studies should focus on considering the responses of both corporate and individual customers. Again, this study is a cross-sectional survey, which is a one- time survey. Future studies can consider longitudinal survey which involves engaging respondents on more than one period of time. Finally, this study is contextualize in Ghana and might not reflect evidence from other countries. Hence, studies in other countries is therefore encourage for comparison and generalization purposes.

## Appendix

### Measurement Scale

Innovation characteristics: adapted from Wisdom *et al.* (2013)

INI: Ability to try the innovation influence my adoption

INC 2: The availability of information influence my adoption

INC 3: The relative advantage of the innovation influence my adoption

INC 4: The easiness of the innovation usage influence my adoption

INC 5: The fitness of the innovation into my culture influence my adoption.

Individual customer characteristics: adapted from Wisdom et al. (2013)

IC 1: My risk tolerance influence my adoption

IC 2: My experience on innovation influence my adoption

IC 3: My personal association with the organization influence my adoption

IC 4: My preparedness to change influence my adoption

Organizational characteristics: adapted and modified from Wisdom et al., 2013; Tobbin, 2010)

OC 1: The culture and values of the organization influence my adoption

OC 2: The bank's size and age influence my adoption of their innovation

OC 3: The bank' network and relationship influence my adoption

OC 4: Social network with the bank's staff influence my adoption

External factors: Adapted and modified from (Wisdom et al., 2013; Tobbin, 2010)

EF 1: My decision to adopt digital innovation from a bank is influenced by government policy and regulation

EF 2: Free trade policy influenced my adoption of digital innovation

EF 3: Social linkages influence my adoption

EF 4: Ecological and environmental friendliness influence my adoption

Adoption: modified from Mani and Chouk (2016)

A 1: I mostly buy with digital wallet than cash

A 2: I often recommend digital wallet payment than cash

IA 3: often prefer using digital wallet for payment

A 4: I often like paying with digital wallet than cash

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