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Article in The International Journal of Organizational Diversity · June 2024

DOI: 10.18848/2328-6261/CGP/v24i02/17-40

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Original Research

The Role of Digital Financial Literacy for Inclusive Banking in Tanzania

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Received: 11/24/2023; **Accepted:** 01/28/2024; **Published:** 06/28/2024

Abstract: Technology adoption through digital banking has transformed the delivery of banking services not only in Tanzania but across the globe. Digital banking (DB) as a delivery model has proven to be effective in reducing banks' operational costs, reaching the unbanked, and ensuring timely and convenient services to the banked. It is evident there are high levels of adoption of this model in developed economies as compared to most developing countries, thus limiting financial inclusion in the banking sector. To explore this phenomenon, this study examines the role of digital financial literacy in influencing the use of digital banking services. In addition, the study examines whether the differences in demographic characteristics affect the relationship between DFL and DB. Applying the Technology Accepted Model (TAM) this study considers digital financial literacy as a factor that influences ease of use in digital banking technology adoption. This study employed a cross-sectional survey that involved a sample of 440 respondents from four regions in Tanzania. The Smart PLS-SEM technique was used for data analysis and testing the study hypotheses. Results indicate digital financial literacy has a positive and significant influence on the use of digital banking. In addition, it was noted that level of income and age have a moderating impact on this relationship. However, differences in gender and residential location have no significant effect on the relationship between DFL and DB. The findings of this study inform policymakers, regulators, and financial services providers on the dimensions of digital financial literacy and how DFL can improve the demand-side capability of consumers. Further, the findings of this study inform the design and delivery of national initiatives on matters related to financial education, financial consumer protection, and digital financial inclusion.

Keywords: *Digital Financial Literacy, Digital banking, Moderation and PLS-SEM*

Introduction

Digital banking, commonly known as electronic banking, is a subset of electronic finance; it refers to using technology tools, platforms, and ecosystems to automate the delivery of banking products and services (Schaechter 2002). The use of technology to deliver financial services provides innovative financial products and service models, increases access to finance, reduces transaction costs, and improves customer experience. The most common digital distribution channels in the banking business include ATMs, internet banking, telephone banking, agency banking, mobile banking, and debit card payment services (Cracknell 2004).

The digital banking model has provided financial service providers with an opportunity to reach the low-income individuals in rural areas, the unbanked, and the underserved in the society who previously had no access to banking services due to distance barriers from nearest branches. Services such as ATMs, internet banking, point-of-sale machines (POS), agency banking, and mobile banking have brought banking services closer to where people live than it was over the past few decades (Collins 2009). This implies that through digital banking people have access to a range of services, including cash deposits and withdrawals, sending remittances to their relatives, paying bills either through an agent within walking distance or through a mobile platform, and a potential customer opening a bank account through a retail outlet close to home (Ivatury and Mas 2008).

Despite the evidenced benefits of digital banking in developed economies, the model has not been successful in most developing countries due to various limitations. This study specifically associates the low adoption of digital banking in these countries with consumers' behavior. It is well known that electronic banking is an active technology that requires a consumer to have continuous interactions with technology but also have the comfort to navigate for ease of access and use (Hogarth and Anguelov 2004). However, for people to properly interact with digital finance technologies they require a special skill, which in this paper is referred to as digital financial literacy.

Literature defines Digital Financial literacy (DFL) as the possession of knowledge for accessing and use of digital platforms for banking services or making payments for the purchase of goods and services (Prasad, Meghwal, and Dayama 2018). In this study, DFL is defined as a special financial literacy required for accessing and using digital financial technology platforms (Setiawan et al. 2020).

DFL is an important capability people need to cope with increasingly complex financial markets, which have modernized traditional banking by adopting digital technology to deliver services. Therefore, consumers need to have the adequate digital financial literacy to access these digital banking services (OECD 2018). Despite this fact, studies suggest that digital financial literacy in developing countries is low, and its ability in influencing people's financial behavior has not received significant attention from researchers (Setiawan et al. 2020).

Research Problem and its Significance

Banks in Tanzania have adopted digital technology to deliver banking services. This delivery model is a cheap and convenient way to reach the unbanked and those residing in remote areas. However, its adoption among Tanzanians is limited due to low access to banking in the country, which is at 22 percent (Lay 2017). The high level of unbanked is explained by various factors, such as limited knowledge and capabilities for people to use digital platforms to access or use banking services. A notable gap in the literature exists due to limited information on the level of digital financial literacy and its ability to influence the use of digital banking services in Tanzania.

This study, therefore, examines the role of DFL in influencing the adoption and use of digital banking services. The findings of this study contribute to the theoretical body of knowledge by extending the application of the theory of TAM in relating DFL and DB. In addition, the study informs and guides policymakers, financial educators, and banks on how to incorporate digital financial literacy in national financial education programs and in the design of electronic banking products to match the DFL profiles of their existing and potential customers.

Related Literature Review

Theoretical Literature

Banking consumers require digital financial literacy to comfortably interact with the digital platforms created to access information about banks' products and services, understand product features and their associated risks, make optimal financial decisions, and properly navigate across digital financial platforms. Studies in digital financial services suggest that for people to adopt digital banking it is important to ensure that there is customer-centric product design (Chille 2018), reduced complexity in using digital platforms (Bankole, Bankole, and Brown 2011), a technology solution that provides a relative advantage to users by addressing their needs (Abdinoor and Mbamba 2017), prioritized data security and privacy to users (Gerrard and Cunningham 2003), adequate computer and technological skills to users (Laforet and Li 2005), and capability by banks to resolve customers' complaints and disputes (Mattila, Karjaluo, and Pento 2003; Ndirangu 2013).

Given the development and financial sophistication in the world, consumers need to have the necessary skills to effectively use digital financial services and avoid fraud and costly mistakes. In response, studies have recommended countries equip people with adequate financial education necessary to cope with financial sophistication when using digital financial services (Morgan, Huang, and Trinh 2019; Prasad, Meghwal, and Dayama 2018). In addition, Servon and Kaestner (2008) emphasize the importance of DFL, concluding that unless consumers have the appropriate digital literacy that entails technology and financial literacy, the adoption of electronic banking will be limited to a few people. Similar concern has also been raised in studies by French, McKillop, and Stewart (2020) and Panos and Wilson (2020), who noted that digital financial illiteracy triggers unsophisticated financial consumers to make bad financial decisions, due to impulsive behavior or accepting costly, short-term digital credit.

Literature has provided evidence of the relationships between DFL and DB. For instance, Morgan and Trinh (2019b) studied the effects of financial literacy on awareness and use of financial technology in Lao People's Democratic Republic and noted that financial literacy significantly relates to awareness and use of digital financial products and services. In addition,

financial literacy was found to be effective in building consumers' confidence in engaging with the digital financial platform and therefore ease the use of digital banking services.

Digital Banking in Tanzania

Tanzania has made notable progress in the past decade in the adoption and use of digital banking services. Local and foreign banks use financial technologies to deliver a range of digital banking services, including ATMs, agency banking through POS, internet banking, debit/credit cards and mobile banking services accessed through computer and mobile phone platforms (BOT 2019). However, these delivery channels are not used by most people as expected due to various limitations as discussed in the next paragraphs.

A mobile banking study by (Nyamtiga and Laizer 2013) noted that customers are concerned with the protection of their monies before they accept the digital finance model. Therefore, the effectiveness of security controls influences the adoption of the mobile banking model. Similarly (Abdinoor and Mbamba 2017) studied mobile banking adoption in Tanzania and noted that people's awareness, perceptions of usefulness, and benefits of the model influence the adoption of mobile banking.

Concerning the adoption and use of internet banking, (Chuwa 2015) noted that Small and Medium Scale Enterprises' decision to use internet banking is influenced by relative advantage, compatibility, demographics (age, income, education level, and occupation), and social influence. In addition, complexity, perceived risk, and perceived cost were found to have a negative influence on individual internet banking adoption. On the other hand, Abeka (2012) conducted a study on internet banking adoption by corporates in East African countries, including Tanzania, and noted that internet banking adoption is influenced by perceived usefulness, ease of use, and bank support.

Further, studying the adoption of an ATM model in Tanzania, Mbogoro and Masele (2020) noted that, despite its convenience and relief from carrying large amounts of cash, few people use ATMs for withdrawal and an insignificant proportion for cash deposits. The low adoption of the use of ATMs is due to perceived cyber security risks, unavailability of services due to network challenges, low levels of digital financial literacy, and limited distribution of ATM services across the country. In addition, Matimbwa and Ochumbo (2018) noted that ATMs have helped banks to handle voluminous transactions within a short time and increased customer satisfaction due to flexibility and timesaving in accessing services. However, technological challenges, processing failures, and perceived cost are limiting the adoption and contributes to customer dissatisfaction in the model.

Another evidence of the use of digital banking is provided by Lotto (2016) who has so far pioneered agency banking research in Tanzania. The study results confirmed that agency banking has reduced both the distance barrier to customers and operating costs to banks. In addition, the author emphasizes that security controls and awareness of the model are important for people to have trust and increased acceptance of the delivery model.

It is also worth noting that in efforts to reduce the level of financial illiteracy, Tanzania has the National Financial Education Framework (NFEF 2016) as a policy tool to guide strategic financial education initiatives aiming at narrowing the financial illiteracy gap in the country. However, the scope of the framework does not cover issues related to the digital financial literacy concept and its role in influencing the use of digital financial platforms.

Gaps in Literature

Literature suggests that limited awareness of digital financial platforms, risks involved in the use of financial technology, unaffordable cost, compromised privacy, and poor communication infrastructure limit factors in the adoption of digital financial services (Abdinoor and Mbamba 2017; Agwu and Carter 2014). However, little attention has been placed by researchers on the area of digital financial literacy, and therefore there is limited knowledge on the status of digital financial literacy across countries and rare evidence on its relationship with the adoption and use of digital financial services (Prasad, Meghwal and Dayama 2018; Setiawan et al. 2020). This study, therefore, reduces this knowledge gap by examining the ability of DFL to influence the use of digital banking services in Tanzania.

Conceptual Framework

In this study, perceived ease of using theoretical constructs of TAM-3 (a framework that explains how individuals come to accept and use new types of technology) is assumed to influence individual digital banking behavior (Davis 1989; Venkatesh and Bala 2008). The authors hypothesize that ease of use is developed in an individual through possession of digital financial literacy (DFL) and thereafter DFL influences people's perception and behavior toward the adoption and use of digital banking services (DB). In addition, the relationship between DFL and DB is presumed to be impacted by variations in demographic characteristics across people. Figure 1 provides the conceptual framework of the hypothesized path relations.

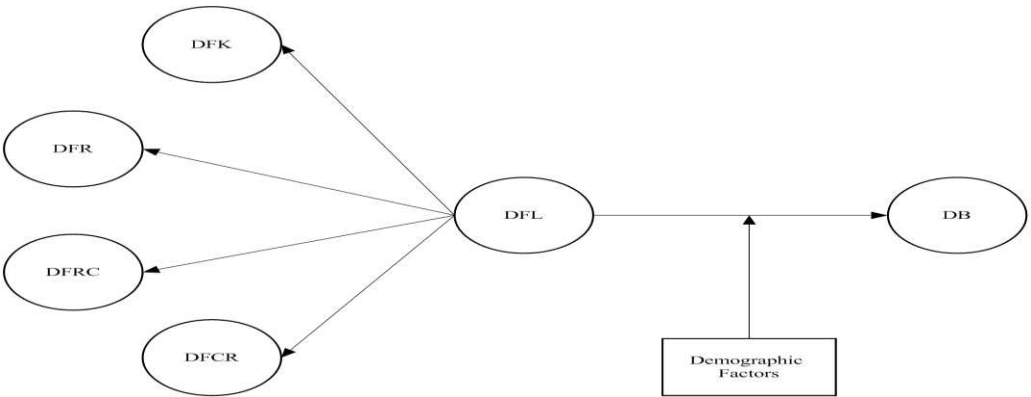


Figure 1: Conceptual Framework

Hypothesis Development

Previous studies on electronic banking indicate that personal characteristics such as perceived ease of use perceived benefits and computer literacy influence people to adopt and use electronic banking services. However, little is known about the ability of DFL to influence digital banking. DFL entails an understanding of digital banking products and awareness of digital finance risks and their control mechanisms and issues related to digital finance consumer protection. This study links these dimensions of digital finance literacy as important capabilities required to influence the use of digital banking services. This study, therefore, hypothesizes the following:

H1: there is a significant positive relationship between DFL and DB.

In addition, many studies have examined the impact of demographic characteristics in the adoption of new technology and specifically electronic banking. However, there is limited literature that explains the moderating effect of demographic variables in the relationship between digital finance literacy and the use of digital banking services. Specifically,

- **Gender:** Gender differences may be associated with differences in attitude toward the adoption and use of digital banking among males and females. Thus, this study hypothesizes:

H2a: The relationship between DFL and DB is strong for males as compared to females.

- **Residential Location:** previous literature suggests that residing in rural or urban areas matters when it comes to the attitude of people toward using digital banking services. Therefore, the authors hypothesize:

H2b that the relationship between DFL and DB is strong in people from urban than in their counterparties in rural areas.

- **Level of education:** People differ in the level of education irrespective of whether they are banked or unbanked. Previous literature has indicated that people with a higher level of education are likely to adopt electronic banking. Based on this evidence:

H2c examines if the level of education moderates the relationship between DFL and DB.

- **Age:** Previous literature has found that young people are more likely to adopt new technology compared to older people. In this regard:

H2d predicts that differences in age groups matters in the ability of digital finance literacy to influence people's use of digital banking services.

Methodology

This study adopted a quantitative research approach. Partial Least Square—Structural Equations Modeling (PLS-SEM) technique through path analysis was used to determine the relevance of DFL in influencing DB. In addition, the study employed Multi-Group Analysis (MGA) in SmartPLS software to determine the moderating effect of demographic characteristics on the relationship between DFL and DB.

Sampling Procedure and Data Collection

Since the study was intended for adult Tanzanians living in rural and urban areas, a two-staged sampling procedure was adopted. Stage one used stratified cluster sampling, where two regions with high levels of financial inclusion and another two with low levels of financial inclusion in the country were purposively selected to ensure good representation of active and potential users of banking services. From each of the four regions selected, notably Dar es Salaam, Simiyu, Mara, and Arusha, one rural district and another urban district were selected to ensure that the sample had respondents of diverse demographic characteristics. It is from these districts that a list of streets for urban areas and villages for rural areas was established, and thereafter twenty streets/villages were randomly selected for sampling.

In stage two, random sampling was employed in each selected street/village with a sample size of 440 at a 5 percent margin of error. Finally, one person was randomly selected as a respondent in each household, based on their availability and convenience.

In this study, the population size was 1.1 million households representing 403 rural and 498 urban streets. Data was collected once through a cross-sectional survey. Respondents were asked customized questions that related to a similar digital financial literacy study (Prasad, Meghwal, and Dayama 2018). Further, before actual data collection, a pilot study was conducted to test and perfect the research instrument.

Measurement of Study Variables

Digital financial literacy (DFL) is an independent variable. It is measured as an exogenous latent variable through observable items in four dimensions. Respondents were asked to provide a rating on a scale of one to five on their perceptions of knowledge of digital financial products (DFK); awareness of digital financial risks (DFR); possession of skills to control and manage digital finance risks (DFRC); and understanding of digital finance consumers' rights

and redress procedures (DFCR). The set of questions for each item in the research instrument was consistent with the theoretical foundations of TAM (Davis 1989) and empirical literature on digital financial literacy studies (Morgan, Huang, and Trinh 2019; Prasad, Meghwal, and Dayama 2018 ; Setiawan et al. 2020).

On the other hand, usage of digital banking services is a dependent variable measured as a latent endogenous variable. The latent variable is represented by several observable items including owning a bank account, proximity to a bank access point, having an active savings account, use of agency banking, and use of mobile banking consistent with previous electronic banking studies, (Marakarkandy, Yajnik, and Dasgupta 2017).

In addition, the moderating variables (gender, residential location, level of education, and age) were measured as categorical variables, and each was grouped into two groups to allow for Multi-Group Analysis (MGA) when testing the moderating effect of each moderator in PLS-MGA.

Ethical Considerations

Throughout the research, the respondent's right to anonymity and privacy was preserved. In addition, respondents had an opportunity to withdraw at any stage from the questionnaire. Similarly, the COVID-19 protocols were observed during data collection to protect both the researchers and respondents. Further, the researcher's contacts were provided to respondents to facilitate communication in case of ethical concerns.

Data Analysis and Results

This section provides details of how the measurement model and the hypothesized causal relationships were analyzed by using the SmartPLS–Structural Equation Modeling (SEM) technique.

Measurement Models

In this study, DFL is measured as a higher-order construct made of first-order observable indicators in the four dimensions of DFL. The higher-order model was adopted on the basis that it helps to develop a structural model that is simple and easier to understand, given that DFL is a multidimensional and complex concept (Matthews, Matthews, and Hair 2018). In PLS-SEM analysis of higher-order constructs, the measurement model involves a two-stage testing of the lower-order and the higher-order model components to confirm the reliability and validity of the constructs before structural model analysis (Matthews, Matthews, and Hair 2018). The details of how the first order and higher-order measurement model for DFL were developed are provided in this section.

Measurement Model for Reliability and Validity Assessment

In ensuring the reliability of data, the research instrument was developed by adopting validated research questions from previous related studies. In addition, the questionnaire was translated to Swahili to allow conversion and ensure interactions with respondents. Further, the correlation of responses for each question with others was tested by using Cronbach's alpha method by calculating internal consistency and composite reliability coefficient. The construct validity was ensured by sharing the research instruments with professionals and practitioners in the fields of banking and soliciting comments on its coverage in the theoretical domain and thereafter a pilot survey for testing the instrument.

Factor Loading Analysis

To ensure there is consistency and reliability in the factors used to measure the study variables, factor loadings were analyzed to test the extent to which each item explains the dimension of a factor. The minimum threshold criteria for an acceptable item is when its regression weight (factor loading) in a construct is at least 0.5 (Wolfinbarger and Gilly 2003). After the analysis, items that had loadings below 0.5, or those which were above the threshold but had collinearity issues or affected discriminant validity of both the independent and dependent variables, were removed from the measurement models. The measurement model with items that ensured internal consistency is provided in Figure 2.

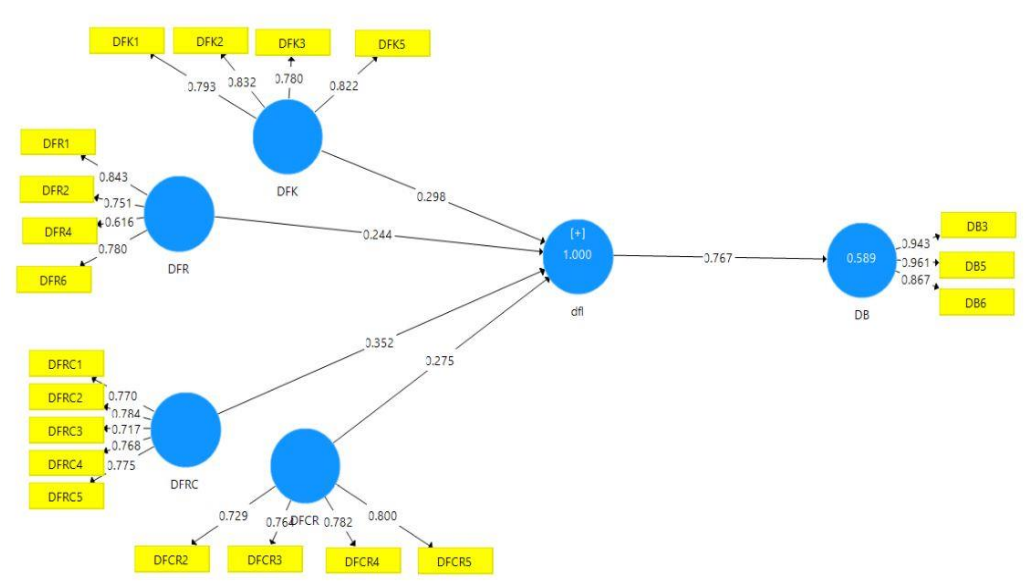


Figure 2: Measurement Model
Source: Mmari et al.

Internal Consistency Reliability and Convergent Validity of the First Order Model

In PLS-SEM, internal consistency is measured by Cronbach’s alpha (CA) and composite reliability (CR) while convergent validity is measured by average variance extracted (AVE). The general rule for acceptance of the factor in the measurement model is when CA is at least 0.6, CR is at least 0.7, and AVE is at least 0.5 (Hair, Sarstedt, and Ringle 2019). Results of the factor analysis for the measurement model indicated that CA for all the variables ranged from 0.7 to 0.9, composite reliability for all the variables ranged from 0.8 to 0.9, while AVE for the variables ranged from 0.5 to 0.8. Details of the reliability test are provided in Table 1.

Table 1: Construct Reliability and Validity Results for the Measurement Model

<i>Construct</i>	<i>Cronbach’s Alpha</i>	<i>Composite Reliability</i>	<i>Average Variance Extracted (AVE)</i>
DFK	0.822	0.882	0.651
DFR	0.741	0.837	0.566
DFRC	0.820	0.874	0.582
DFCR	0.770	0.853	0.592
DB	0.914	0.946	0.855

Source: Mmari et al.

Discriminant validity: Discriminant validity was measured by using Fornell and Larcker’s (1981) Heterotrait -Monotrait (HTMT) ratio and Henseler, Ringle, and Sarstedt’s (2015) tests. The general rule for acceptance for the Fornell and Larcker criterion is when the shared variance for all the constructs is less than their AVEs, while in the case of HTMT ratio, the maximum acceptable threshold for the ratio should be within 0.9.

Results of the discriminant validity test indicate both the Fornell and Larcker criterion and HTMT ratio were within the acceptable limits. The Fornell and Larcker matrix indicated that the square root of AVE of each construct is greater than the inter-construct correlations while the HTMT ratio for all the constructs in the first-order measurement model was below the maximum threshold of 0.9. Details of the discriminant validity test results are provided in Tables 3–4.

Table 2: Fornell and Larcker Criterion Results for the Measurement Model

<i>Construct</i>	<i>DB</i>		<i>DFCR</i>	<i>DFK</i>	<i>DFR</i>	<i>DFRC</i>
DB	0.925					
DFCR	0.697		0.769			
DFK	0.585		0.620	0.807		
DFR	0.635		0.566	0.604	0.752	
DFRC	0.695		0.707	0.723	0.565	0.763

Source: Mmari et al.

Note: The square root of AVE is shown on the bolded diagonal. Non-diagonal elements are the inter-constructs correlations.

Table 3: HTMT Results for the Measurement Model

Construct	DB	DFCR	DFK	DFR	DFRC
DB	0.818				
DFCR	0.662	0.768			
DFK	0.749	0.735	0.755		
DFR	0.801	0.885	0.873	0.708	
DFRC					

Source: Mmari et al.

Measurement Model for the HOM

In this study, DFL is a higher-order latent construct. The higher-order model (HOM) was developed by using the first-order latent variables. The developed HOM was also subjected to a reliability and validity test to ensure its measurement adequacy. The higher model as represented in Figure 3 indicates DFL as an independent variable with four indicators (DFK, DFR, DFCR and DFRC) each with loadings above the minimum threshold of five and digital banking (DB) as a dependent variable represented by three indicator items each satisfying the requirements for acceptable loading strength.



Figure 3: Higher-Order Model for DFL

Source: Mmari et al.

Construct Reliability and Discriminant Validity Assessment for the HOM Model

The HOM was tested for internal consistency reliability, convergent validity and discriminant validity test by using Cronbach's alpha, Composite Reliability, Average variance extracted, Fornell and Larcker criterion and HTMT respectively, (Fornell and Larcker 1981; Hair, Sarstedt, and Ringle 2020; Henseler, Ringle, and Sarstedt 2015).

Results of the HOM factor analysis indicated the measurement model was of good quality, given that all the variables' items had a CA above 0.6, composite reliability above 0.7, and AVE above 0.5, signifying that the internal consistency and convergent validity of the HOM were established. In addition, the Fornell and Larcker matrix results and HTMT ratio

(i.e. 0.858) of the HOM all indicated that the discriminant validity was achieved. Details of the reliability and validity results of the HOM are provided in Tables 4–6.

Table 4: Reliability Test Result for the HOM

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
DB	0.9	0.946	0.855
DFL	0.9	0.913	0.724

Source: Mmari et al.

Table 5: Fornell and Larcker Criterion Matrix Result for HOM

Construct	DB	DFL	
DB	0.900		
DFL	0.800	0.851	

Source: Mmari et al.

Table 6: HTMT Ratio Results for the HOM

Construct	DB	DFL
DB		
DFL	0.858	

Source: Mmari et al.

Structural Model Analysis

In PLS-SEM, once the HOM satisfies the reliability and validity test, the structural model is used for testing path relations through path analysis and bootstrapping procedures. Specifically, the analysis involves a collinearity test, analysis of the hypothesized path relations, and testing of the significance of the existing path relations (Hair, Sarstedt, and Ringle 2019).

Variance Inflation Factor: Prior to the analysis of path relations, it is necessary to ensure that there is no collinearity between study variables. Variance Inflation Factor (VIF) measures the extent of multicollinearity in a set of multiple regression variables (Hair, Sarstedt, and Ringle 2019). In addition, VIF assessment is an effective statistical procedure to assess if survey data are not affected by common method bias and hence affecting path coefficient results (Kock 2015). The rule of thumb requires VIFs between study constructs not to exceed five (Hair, Sarstedt, and Ringle 2019). In this study, VIF between DFL and DB was at 1.00, far below the maximum threshold, thus confirming there was no significant collinearity between the study constructs or common bias method in the model.

Assessment of the Structural Model: The structural model of the hypothesized causal relationship between DFL and DB was estimated through the Smart PLS-SEM. Standard structural model assessment criteria include model in-sample explanatory power measured by the coefficient of determination (R^2), the measure of cross-validated redundancy (Q^2), and

significance and relevance of the path coefficients (Hair, Sarstedt, and Ringle 2019). Analysis of each assessment criteria follows.

Coefficient of Determination: PLS path model estimation result indicates that overall R^2 is found to be moderate, such that digital financial literacy explains 60 percent of the variance of the endogenous construct of digital banking. Details of the coefficient of determination results are provided in Table 7.

Table 7: Coefficient of Determination (R^2) Results

<i>Construct</i>	<i>R²</i>	<i>Standard Deviation</i>	<i>T-Statistics</i>	<i>P-Values</i>
DB	0.60	0.027	21.746	0.000

Source: Mmari et al.

Path Coefficient: In PLS-SEM, the bootstrapping analysis procedure examines the relationship between constructs by determining their path coefficients and their related t-statistics. In addition, the significance of the path model is determined by the p-values. The path indicates that DFL has a positive effect with a coefficient of 0.8, t-statistics of 43.5 greater than a critical value of 1.645, and a p-value of less than 0.05. Therefore, it implies that the hypothesized relationship between DFL and DB is accepted. Details of the path coefficient are provided in Table 8.

Table 8: Path Model Bootstrapping Analysis Results

<i>Path Model</i>	<i>Beta Coefficient</i>	<i>Standard Deviation</i>	<i>T-Statistics</i>	<i>P-Values</i>
DFL -> DB	0.8	0.018	43.461	0.000

Source: Mmari et al.

Predictive Relevance: Through the blindfolding assessment procedure, Smart PLS-SEM confirms if data points in a reflective measurement model of endogenous constructs are estimated with accuracy. This assurance is determined by the results of Stone-Geisser predictive relevance (Q^2) test, (Geisser 1974). The general rule for a reasonable predictive relevance is when Q^2 is greater than zero (Sarstedt, Ringle, and Hair 2017). In this study, the blindfolding procedure was performed at a distance omission of seven, and the result indicates that the DFL measurement model has a medium predictive relevance of 0.48 (Hair, Sarstedt, and Ringle 2019).

Model fitness Test: Model fitness in PLS-SEM is measured by Standard Root Mean Square Residual (SRMR). Although a tested threshold for SRMR has not been provided, Hu and Bentler (1998) recommends a limit of SRMR below 0.08 to be acceptable for a quality structural model fit. In this study, the estimated model SRMR is at 0.06, thus indicating that the model is fit to estimate DB.

Analysis of the Moderation Effect: PLS-MGA approach was conducted to determine if the categorical moderators had a significant impact on the relationship between DFL and

DB. Data for gender were grouped into two groups, male and female, and the residential location was grouped into two groups, urban and rural. On the other hand, age groups were categorized into two groups, young and old, while respondents' level of education categories were also grouped into two groups, low education and the educated.

PLS-MGA through bootstrapping procedures examines if the variances of the parameter estimates differ significantly across the two groups. The analysis is done on path coefficients, standard error, and p-value of the two path models. In this study, the moderation analysis results indicated there is a positive difference between gender groups and residential location groups. However, the differences were not statistically significant, thus implying that gender and residential location do not have a moderating impact on the relationship between DFL and DB. MGA results for gender and residential location are provided in Tables 9–10.

Table 9: MGA Results for Gender

<i>Path Model</i>	<i>Path Coefficients-diff (Male vs Female)</i>	<i>P-Value (Male vs Female)</i>
DFL -> DB	0.01	0.384

Source: Mmari et al.

Table 10: MGA Results for a Residential Location

<i>Path Model</i>	<i>Path Coefficients-diff (Urban vs Rural)</i>	<i>P-Value (Urban vs Rural)</i>
DFL -> DB	0.002	0.498

Source: Mmari et al.

In addition, the result for categorical moderators' level of education and age indicated a positive and significant impact on the relationship between DFL and DB. This implies that people who are educated and the old—if they have digital financial literacy—are likely to use digital banking services. The magnitude of the path differences between the two groups, and their significance level, is provided in Tables 11–12.

Table 11: MGA results for Education

<i>Path Model</i>	<i>Path Coefficients-diff (Educated vs -Low- Education)</i>	<i>P-Value (Educated vs Low- Education)</i>
DFL -> DB	0.287	1.00

Source: Mmari et al.

Table 12: MGA Results from Age

<i>Path model</i>	<i>Path Coefficients-diff (Old vs. Young)</i>	<i>P-Value (Old vs. Young)</i>
DFL -> DB	0.09	0.004

Note: For PLS-MGA significance level is established (YES) when the p-value is less than 0.005 or greater than 0.95, otherwise not established (NO).

Source: Mmari et al.

Discussions of the Results

In this paper, we estimate the effect of DFL on digital banking based on the presumption that digital financial literacy is necessary for people to easily interact and use financial services delivered through digital platforms. Estimation result indicates that DFL has a positive and significant impact on influencing the adoption and use of digital banking services. This result is consistent with the theory of the TAM by confirming that perceived ease of use is developed through digital financial literacy and therefore provides people with the necessary capability to adopt and use digital banking. The evidence from Tanzania on the ability of DFL to influence digital banking is consistent with previous studies (Tony and Desai 2020; Setiawan et al. 2020) that concluded DFL influences financial inclusion and people's saving and spending behavior.

Further, it is noted that young people's response to adoption and use of digital banking, even if they are given financial literacy education, is less compared to older people. Similarly, studies have shown that millennials are less likely to adopt digital banking services as compared to older people (Lusardi, Scheresberg, and Avery 2018 ; Setiawan et al. 2020). Therefore, we note that digital financial illiteracy can subject young people to making adverse financial decisions that may affect their future financial well-being for a long time. Considering the potential for youth in the labor market and the need for their active participation in the financial system, banks are recommended to adjust their business models and product design to align with the preferences of the young generation as a mechanism to promote digital financial inclusion.

Furthermore, the findings suggest that level of education moderates the influence of DFL on the use of digital banking services. This implies that the educated are likely to have knowledge of economic and financial concepts and thus, once they have access to DFL programs, they are likely to use digital banking services. Similar findings have been reported in previous financial literacy and electronic banking studies (Andreou and Anyfantaki 2019; Kolodinsky, Hogarth, and Hilgert 2004).

Finally, the study provides empirical evidence that negates the notion that being male or residing in urban areas matters when it comes to the ability of DFL to influence the adoption and use of digital banking services. The evidence of the insignificant influence of gender and residence location was also reported in e-banking studies (Fonchamnyo 2013; Morgan and Trinh 2019c). This result implies that ownership of cell phones, adoption of the agency banking model by banks, and rural electrification has reduced geographical limitations to accessing banking services in Tanzania. In addition, results on gender indifferences imply that the impact of digital finance education on existing and potential DB users are likely to be the same, irrespective of gender.

It is therefore important that practitioners, policymakers, and academia provide people with the necessary digital financial knowledge as a response to demand-side challenges for digital financial inclusion.

Contribution of the Study

The findings of this study provide both theoretical and practical contributions. Theoretically, this study contributes to the theory of TAM by introducing DFL as a predictor of digital banking technology. Further, the study extends the usage of TAM by introducing the level of education and age as moderators of the relationship between DFL and the use of digital banking technology. The study identifies items that explain DFL and confirms its influence on developing people's ability to engage with digital banking. This empirical evidence therefore informs the development of effective digital banking delivery models and the provision of DFL programs.

On the other hand, the study guides policy interventions by the government and financial institutions on the importance of equipping people with knowledge of digital financial products and services, digital financial risks and their control mechanisms, and digital financial consumer rights and protection mechanisms to improve the adoption and use of digital banking services. The findings of this study confirm no significant difference exists between males and females or between people residing in rural or urban areas when it comes to the ability of DFL to influence DB. As such, banks and financial educators are encouraged to equally prioritize the delivery of digital finance education programs to these groups because favoring men over women or the urban residents over rural does not guarantee increased market share, since its impact on the adoption of electronic banking is likely to be the same.

Conclusion

This study provides empirical evidence of how TAM can be used to examine the influence of digital financial literacy on the use of digital banking. Analysis of the hypothesized path relations through Smart PLS-SEM indicates that DFL has a positive and significant influence on the use of digital banking services. The positive and significant influence of DFL on DB implies that people with DFL are likely to have the capability to understand, demand, and use digital banking services. Further, regarding the effect of demographic factors on this relationship, the study identifies that gender and residential location has no moderating effect on the relationship between DFL and DB. Level of education and age are found to have a moderating impact on the relationship between DFL and DB, such that the relationship is strong for the educated and older populations as compared to their low-educated and young counterparties respectively.

The authors of this study understand that digital financial literacy may be relevant to digital financial services other than banking. However, the scope of this study was limited to examining the relationship between DFL and the use of digital banking. Therefore, future studies in DFL should address this limitation and extend their scope by considering other financial services delivered through digital platforms to enhance the generalization of the results.

AI Acknowledgment

Generative AI or AI-assisted technologies were not used in any way to prepare, write, or complete essential authoring tasks in this manuscript.

Informed Consent

The author has obtained informed consent from all participants.

Conflict of Interest

The author declares that there is no conflict of interest.

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Appendices

Appendix A: Factor Loadings

Items	Questions	DB	DFCR	DFK	DFR	DFRC
DB3	I have an active bank account	0.943				
DB5	I have used agency banking in the last year	0.961				
DB6	I have used mobile banking for the last year	0.867				
DFCR2	When I face transactional challenges or fraud when using electronic banking platforms, I know how to obtain redress		0.729			
DFCR3	Banks have no right to use my privacy data without my consent or permission from authorities.		0.764			
DFCR4	I often face difficulty when transacting using electronic banking channels		0.782			
DFCR5	My Bank can resolve challenges that may arise when using electronic banking products and services.		0.800			
DFK1	I have a good understanding of electronic banking products and services			0.793		
DFK2	I know very little about the pros and cons of digital financial services			0.832		
DFK3	I have the competence and knowledge to access and use electronic banking			0.780		
DFK5	I have experience in using electronic financial services			0.822		
DFR1	I am aware of the risks arising from the use of electronic banking				0.843	
DFR2	I am likely to incur a financial loss when using electronic banking				0.751	
DFR4	A high appetite for digital loans can lead to indebtedness				0.616	
DFR6	I trust electronic banking service providers to the extent that I care less about understanding the terms and conditions of their services				0.780	

DFRC1	I have a PIN for protecting myself from digital finance risks					0.770
DFRC2	I usually change my PIN at least once after every two months					0.784
DFRC3	I usually consult experts or Bank Officers for things that I don't know regarding electronic banking					0.717
DFRC4	I usually read and verify the terms and conditions of digital finance products before I accept a service.					0.768
DFRC5	Strictly, it is not a good idea to share my PIN with close friends and family					0.775

Key: Digital Banking (DB); Knowledge of digital financial products (DFK); Awareness of digital financial risks (DFR); Possession of skills to control and manage digital finance risks (DFRC); and understanding of digital finance consumer's rights and redress procedures (DFCR).

Appendix B: Individual Questionnaire

Do you consent to participate in this research? Yes [] No []

SECTION I: Demographic characteristics of Respondents

Please provide the appropriate response by ticking (√) on the space provided in the response options.

- What is your Age? Ranging from 18 years and above.
Young Adult: 18-25. []; Adults 26-35. []; Middle aged Adult: 36-54 []; Old: above 55 []
- What is your Gender? Male: []; Female: []
- Which among these describes your residential location? Urban: [] Rural: []
- What is your highest level of education: No formal education [] Primary [] Secondary [] Diploma/Certificate [] University /College Graduate []
- What is your monthly income in TZS?
Below 65,000 TZS []; 65,001 TZS to 400,000 []; 400,001 TZS to 1,000,000 []; Above 1,000,000 TZS []
- What is your employment status?
Employee []; Self-employed[]; Farmers []; Unemployed[]

SECTION II: Digital Financial literacy

- Kindly provide your opinion on digital financial literacy in the response space provided.

CODE	Statement					
		<i>Strongly Disagree</i>	<i>Dis-agree</i>	<i>Not sure</i>	<i>Agree</i>	<i>Strongly Agree</i>
DFK		1	2	3	4	5
DFK1	I have a good understanding of electronic banking products and services					
DFK2	I know very little about the pros and cons of digital financial services					

DFK3	I have the competence and knowledge to access and use electronic banking					
DFK4	I understand that some digital financial product and services are informal or not authorized by the Government					
DFK5	I have experience in using electronic financial services					
DFR						
DFR1	I am aware of the risks arising from the use of electronic banking					
DFR2	I am likely to incur a financial loss when using electronic banking					
DFR3	I can be exposed to online fraud and cyber-security attacks when using electronic banking					
DFR4	A high appetite for digital loans can lead to indebtedness					
DFR5	The use of electronic banking increases the risk of miss-use of my personal data by third parties					
DFR6	I trust electronic banking service providers to the extent that I care less about understanding terms and conditions of their services					
DFRC						
DFRC1	I have a PIN for protecting myself from digital finance risks					
DFRC2	I usually change my PIN at least once after every two months					
DFRC3	I usually consult experts or Bank Officers for things that I don't know regarding electronic banking					
DFRC4	I usually read and verify the terms and conditions of digital finance products before I accept a service.					
DFRC5	Strictly, it is not a good idea to share my PIN with close friends and family					
DPCR						
DPCR1	I know my rights and obligations when using electronic banking products and services.					
DPCR2	When I face transactional challenges or fraud when using electronic banking platforms, I know how to obtain redress					
DPCR3	Banks have no right to use my personal privacy data without my consent or permission from authorities.					

DFCR4	I often face difficulty when transacting using electronic banking channels					
DFCR5	My Bank is capable of resolving challenges that may arise when using electronic banking products and services.					

SECTION III: *Digital Banking*

8. Below is a list of questions about the Access and Usage of Digital banking services. Please, kindly choose the right statement that works in your situation by ticking (✓) in the space provided.

CODE	Statement	YES	No
<i>Financial Inclusion</i>			
DB1	I have an active bank account		
DB2	I can access either an ATM or bank Agents within 5km from where I live.		
DB3	I have saved in a bank for the past twelve months		
DB4	I have borrowed from a bank for the past twelve months		
DB5	I have used agency banking in the past twelve months		
DB6	I have used mobile banking in the past twelve months		

Thank you very much for your time and valuable responses.

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