



Banking digitalisation in Africa: an approach based on the TAM model

Dr El Mrabet El Bannai Chahlae¹

¹Abdelmalek Essaâdi University, Morocco, chahlae.elmrabet@uae.ac.ma



ABSTRACT

This study analyses the main determinants of the adoption of digital banking in Africa, drawing on the Technology Acceptance Model (TAM). It seeks to understand the role of several factors, including perceived usefulness, perceived ease of use, use of information systems, attitude towards use and perceived security.

The research adopts a quantitative approach based on a questionnaire administered to executives in the banking sector. The data collected were analysed using statistical tools,

notably SPSS, JASP and factor analysis methods. The measurement scale is based on a five-point Likert scale. The questionnaire was also pre-tested with executives to assess the comprehensibility and consistency of the items.

The results show a generally favourable perception of digitalisation in banking. In particular, respondents consider that digital systems can make work easier, improve performance and be relatively simple to use. The results also indicate satisfactory internal consistency across the various scales, with high Cronbach's alpha coefficients. Factor analyses generally confirm the unidimensionality of the constructs and provide evidence supporting their validity.

The study thus highlights the importance of factors related to utility, ease of use, the use of information systems, attitude and perceived security in analysing the adoption of banking digitalisation in Africa.

Keywords: Digital banking; Technology adoption; TAM model; Digital banking services; Perceived utility; Perceived ease of use; Perceived security; Information systems; Africa; Financial inclusion.

1. Introduction

The digital transformation of the banking sector is now a major challenge for financial institutions, particularly in the African context. The development of online banking services, mobile applications and digital payment methods offers new opportunities to improve the efficiency of banks, facilitate access to financial services and contribute to financial inclusion.

However, the adoption of digital banking solutions continues to be influenced by a number of technological, economic and contextual factors. Understanding these factors is therefore essential to effectively support the digital transformation of the banking sector in Africa. Among the theoretical models used to explain the acceptance of new technologies, the Technology Acceptance Model (TAM) places central importance on perceived usefulness and perceived ease of use.

In the African context, these dimensions may be complemented by other factors, notably perceived trust and security, as well as the conditions under which information systems are used. These elements can directly influence users' perceptions and their intention to adopt digital banking services.

With this in mind, this article aims to analyse the main determinants of the adoption of digital banking in Africa using a quantitative and confirmatory approach. The study is based on a questionnaire survey conducted amongst banking sector executives and employs statistical analysis methods to assess the reliability and validity of the constructs under investigation. The aim is thus to identify the factors associated with the acceptance and use of digital technologies in the African banking sector.

2. Overview of the general approach

Our study employed mixed methods and instruments for data collection in order to investigate the research objectives.

Consequently, our survey of executives was conducted using a questionnaire; on the one hand, it serves to confirm the

factors influencing digital adoption, and on the other, it aims to predict the acceptance of digitalisation.

Thietart et al. (2014) explained that: 'Research aimed at testing hypotheses via a questionnaire may utilise two successive samples. An initial sample, intended for exploratory and qualitative analysis, may first be constituted and studied to identify hypotheses or validate the data collection instruments. A second sample, intended to collect the data necessary for testing the hypotheses, can then be selected. Thus, only the second sample is directly linked to the research objective of testing the hypotheses, whilst the first sample serves solely to identify or refine the hypotheses to be tested later'.

The choice of questionnaire for data collection is based on its efficiency, ease of standardisation, comparability of measurement, and the statistical analyses it allows (Thietart et al 2014).

Furthermore, a review of the literature on digitalisation, technology acceptance, the Technology Acceptance Model (TAM) and the empirical studies detailed in the theoretical section of this thesis indicates that questionnaire-based surveys are the most widely used method.

We can therefore summarise the overall approach of this thesis as follows:

focuses on describing the process of developing the pilot questionnaire, which is crucial for data collection. Our approach is based on adapting the work of previous researchers who have examined the acceptance and adoption of technologies. By aligning this work with the specific context of our study, we have adapted the original items whilst adhering to Barrak's (2017) recommendations regarding the formulation of questions, including conciseness, simplicity, uniqueness, specificity, neutrality and variety.

For each variable considered, the table below sets out the following details:

- The original measurement indicators.
- The adaptation or contextual translation for the African context.
- The code assigned to each measurement indicator.
- The reference, identifying the original source.

2.1. Survey of senior managers

Table 1: Justification of the measurement indicators in the questionnaire for senior managers.

Constructed	Code	Items	Translation of items	Source
Perceived Usefulness (PU)	PU1	Using digitalisation in my job would enable me to complete tasks more quickly	Using digitalisation in my work would enable me to complete tasks more quickly	Davis 89
	PU2	The use of digitisation improves performance at work	Using digital technology would improve my performance at work	
	UP3	Digitisation would save me time	Digitisation would save me time	
	UP4	Digitisation would allow me to set work objectives more quickly	Digitisation would allow me to complete my work objectives more quickly	
	UP5	Overall, I find digitisation useful in my work	Overall, I find digitisation useful in my work	
Perceived ease of use	FUP1	I think interacting with the digital system will not require much effort	I think interacting with the digital system would not require much effort	Venkatesh and Bala 2008
	FUP2	I find that it would not be complicated to use a digital system	I find that it would not be complicated to use a digital system	
	FUP3	I think the digital system would be easy to use	I think the digital system would be easy to use	
	FUP4	I find it would be easy to get the desired result from the digital system	I find that it would be easy to obtain the desired result from the digital system	Wu and Zhang 2014
	FUP5	I believe that working with digital technology won't be very difficult	I believe that working with digital technology is not going to be very difficult	
	FUP6	I believe that working with digital media won't be stressful for me	I believe that working with digital technology won't be stressful for me	

The use of information systems	USI 1	I am confident in using the digital system: even if there is no one to show me how to do it	I am confident in using the digital system: even if there is no one to show me how to do it	Compeau and Higgins 1995b); Tan and Teo (2000); Pitchu and Lee (2006)
	USI 2	Even though I only have the online instructions to refer to	Even though I only have the online instructions to refer to	
	USI 3	Even though I have never used such a system before	Even though I have never used such a system before	
	USI 4	As long as I've just seen someone use it before trying it myself	As long as I've just seen someone use it before trying it myself	
ATTITUDE TOWARDS USE	AE U1	Using online banking is a good idea.	Using online banking is a good idea.	(Chau and Hu, 2002; Kloppe and McKinney, 2004; Morris and Venkatesh, 2000; O'Cass and Fenech, 2003; Reid and Levy, 2008; Robinson, Marshall and Stamps, 2005)
	AE U2	Generally, I have a positive attitude towards using online banking.	In general, my attitude towards the use of online banking is positive.	(Lu and Lin, 2002)
Perceived security	SP1	If I had access, I would use online banking services.	If I had access to online banking services, I would use them.	(Agarwal and Prasad, 1998; Chen, Gillenson and Sherrell, 2002; Pavlou, 2003; Robinson, Marshall and Stamps, 2005; Venkatesh and Davis, 1996, 2000; Venkatesh and Morris, 2000; Venkatesh, Speier and Morris, 2002; Wang, Wang, Lin and Tang, 2003)
	SP2	I prefer to use online banking services rather than carrying out my banking at a branch.	I prefer to use online banking services rather than carrying out my transactions at the bank counter.	(Agarwal and Prasad, 1998)
	SP3	In the future, I intend to make greater use of the online banking system.	I intend to make greater use of online banking services in the future.	(Chau and Hu, 2002; Lu and Lin, 2002; Pavlou, 2003; Reid and Levy, 2008; Wang, Wang, Lin and Tang, 2003)

With regard to the measurement scale, we used a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

In addition, we included closed-ended questions regarding the manager's age, gender, affiliation and experience with digitalisation.

The questions concerning experience with digitalisation focused on:

- The use of a website;
- The use of mobile apps;
- The use of online banking services;
- The use of digital payments.
- Population and sample size.

Sampling methods are generally divided into two main categories: probabilistic methods and purposive methods. The choice of a method depends on various factors, such as the researcher's subjectivity or objectivity, the analytical generalisation of the results or statistical inference, as well as the specific characteristics of the population under study (Thietart et al., 2014).

In the context of banking digitalisation in Africa and the senior management of these institutions, certain traditional sampling methods are not applicable. For example, simple random sampling and systematic sampling require an exhaustive, numbered list of the population – a resource that is not available in our case.

Stratified sampling, which requires segmentation according to the phenomenon under study, is limited in our context. The only possible segmentation would be based on the institution to which they belong, but this categorisation does not guarantee homogeneity due to differences in areas of work, as well as variations in age, gender, career paths and experience amongst banking executives.

Multi-stage sampling, which involves a progressive selection across different levels, is not applicable, as our study focuses specifically on digital banks in Africa and all their executives.

The quota sampling method appears to be a suitable option in our context, offering the possibility of obtaining a representative sample of the population without requiring a sampling frame. Thus, to conduct our survey on banking digitalisation and its executives, we have opted for the quota sampling method, filling the quotas according to the opportunities that arise within the professional environment of digital banks in Africa.

2.1.1. Testing and revising the questionnaire

Pre-testing the questionnaire is essential for assessing the quality of the chosen measurement instrument, as highlighted by Barrak (2017). In order to assess the comprehensibility of the questions in our questionnaire and the internal consistency of its constructs, we submitted it to seven bank executives in Morocco, notably from Attijari Wafa Bank, CIH, BMCE, BMCI, and Banque Populaire.

These executives were selected on the basis of their availability, the ease of contacting them, and their willingness to discuss and share their views. We also took care to ensure a diverse range of profiles to guarantee the best possible understanding of our questions.

Analysis of the individual responses demonstrated that all respondents had an adequate understanding of all the questions. Furthermore, no contradictions were identified in the responses provided, thereby reinforcing the validity and consistency of the questionnaire.

2.1.2. Analysis of the internal consistency of the constructs in the test questionnaire

Cronbach's alpha is a measure of the reliability of a set of questions (items) designed to assess the same phenomenon. The resulting values range from 0 to 1; the closer they are to 1, the higher the internal consistency of the questions is considered to be. In this context, researchers suggest that a Cronbach's alpha of 0.70 is considered acceptable for confirmatory research, whilst a threshold of 0.60 is considered acceptable for exploratory research (Fornell & Larcker, 1981; Hair, Anderson, Tatham, & Black, 1998) (Lee et al., 2009, free translation).

Table 2: Reliability analysis of the items in the questionnaire tested on senior managers.

Variables	Number of items	Cronbach's α coefficient
Perceived usefulness	5	.959
Perceived ease of use	6	.964
Use of information systems	4	.952
ATTITUDE TOWARDS THE USE	2	.989

Perceived safety	3	.946
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All variables show a very satisfactory Cronbach's alpha coefficient, exceeding 0.95.

3. Analysis of results and discussion

We will deepen our understanding of the results obtained from the survey, which focus specifically on senior managers. Our analytical approach will be rigorous, combining different methods to ensure a thorough interpretation of the data collected.

We will begin with a descriptive analysis of the results for each variable in our models, using measures such as the mean and standard deviation. This will provide us with an overall view of the emerging trends in our data. At the same time, we will check compliance with the necessary conditions. This includes sample size, the unidimensionality of the measurement scales (assessed by principal component analysis for each variable), and the normality of the distribution, measured using the 'kurtosis' coefficient.

Next, we will focus on evaluating the external measurement model. This evaluation will be carried out in three distinct stages. Firstly, we will assess reliability and internal consistency using Cronbach's alpha.

Next, we will address convergent validity, using both exploratory and confirmatory approaches. Finally, we will focus on the analysis of discriminant validity, again using exploratory and confirmatory methods.

The final phase of our analysis will consist of evaluating the internal structural model. We will test the hypotheses underlying our models and assess the fit indices obtained. This approach will enable us to gain meaningful insights into the relationship between the various variables under study.

In conclusion, our approach to analysing the results is based on a methodical and comprehensive process, encompassing descriptive analyses, reliability and validity assessments, as well as structural model testing. These combined steps will provide us with an in-depth understanding of the data collected through our surveys, thereby strengthening the robustness of our results and conclusions.

3.1. Analysis of the results from the survey of senior executives

External model evaluation					
			Indicators	Target Value	References
Analysis of the model's reliability and internal consistency			Cronbach's alpha	$\alpha > 0.70$	(Najjar & Najjar 2013) (Jourdan 2016) (Touzani 2014)
			Joreskog's Rhô	>0.7	Jöreskog and Sörbom (2003) 1
Analysis of convergent validity			Composite Reliability (CR)		(Hair et al., 2010)2
			Factor loadings		(Ghadi 2012) (Hair et al., 2010)3
			Average Variance Extracted (AVE)		(Hair et al., 2010)4
			Correlations Measurement indicators	Between The	Indicators measuring the same phenomenon Are strongly correlated with one another (Touzani 2014)
Analysis Discriminant	The	Validity	Exploratory factor analysis		(Gefen 2005); (Fall 2015)
			Confirmatory analysis		Indicators that measure (Gefen 2005).

¹ Cited by (Khine et al. 2013)

² Cited by (Ghadi 2012)

³ Cited by (Ghadi 2012)

⁴ Cited by (Ghadi 2012)

		must show a weak degree of convergence	
Internal model evaluation			
	Indicators	Target Value	References
Hypothesis testing	Critical Ratio (C.R)		(Najjar & Najjar 2013)
	P-value	<0.05	Balambo (2012) ⁵
	'Multi-group' analysis		(Hoyle, 1995; Byrne 2010) ⁶
Fit of fit of the research model	Absolute indices	According to the index	(Hair et al., 2006) ⁷ (Najjar & Najjar 2013) (Coovi 2010)
	Comparative goodness-of-fit index		
	Parsimonious index		

3.2. Survey of executives

In this section, we begin by discussing the characteristics of the sample, followed by a descriptive analysis of the preliminary results. We will then assess the conditions required for the application of the LISREL approach. Finally, we will evaluate the external and internal models used in our research.

3.2.1. Population and sample

The survey of senior executives took place over a five-month period, from 15 April to 15 September 2023. During this period, we successfully collected a total of 70 completed questionnaires, administered electronically via Google Forms.

The number of respondents represents 47 per cent of the total population of the bank's senior managers, estimated at 33. This proportion gives our sample significant representativeness, exceeding the 4 per cent threshold

recommended to ensure valid generalisation. Furthermore, our sample far exceeds the recommended minimum of 30 respondents, as stipulated by Grinnell (2001): 'to ensure reasonable control of sampling error and allow for generalisation of the sample size, a sample of 10 per cent of the population, with a minimum of 30, is considered sufficient'⁸.

It should also be noted that other researchers, such as Ahmed and Osman (2014), have established that a sample representing 12 per cent of the total population is appropriate for the application of structural equation modelling (SEM).

Of the 33 respondents, 18 are men, accounting for 54.54 per cent of the sample, whilst 15 are women, representing 45.46 per cent of the total respondents. These demographic data provide a solid basis for our analysis and will enable an in-depth exploration of the results according to various characteristics.

Table 3: Breakdown of respondent managers by gender.

Frequency			Percentage
Valid	Male	18	54.54%
	Female	15	45.46%
	Total	33	1

Source: Compiled by us using the IBM® SPSS® tool

With regard to the age of respondents, 42.42% are managers aged over 40, 66.66% are aged between 35 and 40, 24.24% are aged under 35 and 9.09% are aged 35 or under. This means that all age groups of managers are represented in our sample.

⁵ Cited by (Barrak 2017)

⁶ Cited by (Najjar & Najjar 2013)

⁷ Cited by (Khine, Ping, & Cunningham 2013)

⁸ Cited by (Ching-Ter et al. 2017)

Table 4: Breakdown of executive respondents by age.

Frequency			Percentage
	Under 35	3	9.09%
	Aged between 35 and 40	8	24.24%
Able-bodied	Aged between 40 and 45		
		14	42.42%
	Aged between 45 and 50	6	18.19%
	Between 50 and 55 years old	2	6.06
	Over 55	0	0
	Total	33	1

Source: Compiled by us using the IBM® SPSS® tool

Banks account for the largest proportion of respondents to our survey, at 21.2 per cent of the total, followed by executives from ATTJARI Wafa Bank (33.33 per cent), BANQUE POPULAIRE (15.15 per cent), BANQUE OF AFRIQUE (18.15 per cent), ECO BANK (9.06 per cent), SOCIETE GENERALE (6.06 per cent) and CIH Bank (18.18 per cent).

Table 5: Breakdown of responding executives by institution.

Frequency			Percentage
Valid	Attijari Wafa Bank	11	33.33%
	Banque Populaire	5	15.15%
	Bank of Africa	6	18.18%
	Eco Bank	3	9.09%
	Société Générale	2	6.06%
	CIH	6	18.18%
	Total	33	1

Source: Compiled by us using the IBM® SPSS® tool

3.2.2. Initial findings: from indifference to acceptance of digitalisation

Regarding the use of digitalisation tools, 65 per cent state that they have banking apps to provide customers with online services. Furthermore, 23 per cent state that they have undergone training to keep up to date and support the wave of digitalisation relating to new technologies in available banking apps.

- The perceived usefulness of digital banking

Perceived usefulness was measured using five indicators, which are:

Table 6: Measuring perceived utility.

Items	Variables
Using digitalisation in my work would enable me to complete tasks more quickly	UP1
Using digitalisation would improve my performance at work	UP2
Digitalisation would save me time	UP3
Digitalisation would enable me to complete my work objectives more quickly	UP4
Overall, I find digitalisation useful in my work	UP5

The responses to the items in this variable also show a tendency towards ‘neutral’,

‘Agree’ and ‘strongly agree’, with averages ranging from 1.2 to 3.40.

- Perceived ease of use

Perceived ease of use was measured using six indicators, which are:

Table 7: Measuring ease of use.

Items	Variables
I think that interacting with the digital system would not require much effort	FUP1
I find that it would not be complicated to use a digital system	FUP2
I think the digital system would be easy to use	FUP3

I think it would be easy to get the desired result from the digital system	FUP4
I think working with digital technology won’t be very difficult	FUP5
I think working with digital technology won’t be stressful for me	FUP6

Responses regarding the perceived ease of use of digitalisation are largely favourable, with a majority of respondents agreeing with all the questions asked. As for the average percentages, these range from 12 per cent to 66 per cent, indicating that most managers hold positive views on the ease of achieving the desired results from a digitalisation system, the lack of difficulties in using it, and the perception that working with such a system will not be stressful.

- The use of information systems

The use of information systems was measured using four indicators, which are:

Table 8: Measuring the use of information systems.

Items	Variables
I feel confident using the digital system: even if there is no one to show me how to do it	USI1
Even if I only have the online instructions to refer to	USI2
Even though I’ve never used a system like this before	USI3
As long as I’ve just seen someone else use it before trying it myself	USI4

The majority of responses regarding the use of information systems indicate general agreement across all the questions asked. The average percentages range from 48 per cent to 66 per cent, highlighting a positive consensus amongst respondents regarding their approval of the use of information systems.

- Attitude Towards Use

Attitude towards use was measured by two indicators, namely:

Table 9: Measuring attitude towards use.

Items	Variables
Using online banking is a good idea.	AEU1
Generally speaking, my attitude towards using online banking services is positive.	AEU2

The majority of responses expressing an attitude towards usage are consistent across all the questions asked. The average percentages range from 48 per cent to 66 per cent, highlighting a favourable consensus amongst respondents regarding their attitude towards usage.

- Perceived Security

Perceived security was measured using three indicators, namely:

Table 10: Measurement of perceived security.

Items	Variables
If I had access to online banking services, I would use them.	SP1
I prefer to use online banking rather than carrying out my transactions at the bank counter.	SP2
I intend to make greater use of online banking in the future.	SP3

Most responses relating to perceived security indicate general agreement across all the questions asked. The average percentages range from 54 per cent to 69 per cent. Analysis of the results reveals that a small percentage – only 15 per cent – express disagreement.

3.2.3. Verification of the conditions for applying the LISREL approach

As outlined in the section on methodology, the use of the LISREL approach requires not only a significant sample size, but also confirmation of the unidimensionality of the measurement scales and the normality of the distribution. In this section, we verify these conditions in order to determine the potential feasibility of applying this approach in the confirmatory study of our research.

- Perceived usefulness

The principal component analysis of the five dimensions of perceived utility also indicates that this measure is unidimensional; only the first variable is greater than 1, at 4.056. This first component explains 77 per cent of the total variance.

The KMO value indicates a high correlation between the scale items (0.77), and Bartlett's sphericity test is significant, allowing us to reject the hypothesis that the correlations between items are weak or non-existent.

Table 11: Kurtosis coefficients for perceived utility.

	UP1	UP2	UP3	UP4	UP5
Average	-0.515	-0.273	-0.061	-0.121	-0.333
Standard deviation	1.679	1.737	1.391	1.431	1.242
Asymmetry	0.302	0.220	-0.108	-0.047	0.583
Standard error of asymmetry	0.409	0.409	0.409	0.409	0.409
Kurtosis	-1.855	-1.822	-1.140	-1.484	-0.568
Standard error of kurtosis	0.798	0.798	0.798	0.798	0.798

The skewness and kurtosis coefficients indicate that the distribution is normal.

- Perceived ease of use

Table 12: kurtosis coefficients for perceived ease of use.

	FUP1		FUP2		FUP3		FUP4		FUP5		FUP6	
Average	-	0.455	-	0.424	-	0.152	-	0.273	-	0.091	-	0.091
Standard deviation		1.348		1.324		1.278		1.442		0.980		0.980
Asymmetry		0.508		0.515		0.205		0.245		0.191		-0.191
Standard error of asymmetry		0.409		0.409		0.409		0.409		0.409		0.409
Kurtosis		-0.845		-0.782		-1.018		-1.496		-2.018		-2.018
Standard error of kurtosis		0.798		0.798		0.798		0.798		0.798		0.798

The principal component analysis of the six dimensions of perceived ease of use indicates that this measure is unidimensional. Only the first variable exceeds 1, with a value of 4.064. This first component explains 68 per cent of the total variance.

The KMO (Kaiser-Meyer-Olkin) value indicates a strong correlation between the items on the scale, with a coefficient of 0.72. Furthermore, Bartlett's sphericity test is significant, which allows us to reject the hypothesis that the correlations between items are weak or non-existent.

- Use of information systems

Table 13: Kurtosis coefficients for the use of information systems.

	USI1		USI2		USI3		USI4	
Average		0.121		0.636		0.545		0.727
Standard deviation		1.023		1.055		0.971		1.232
Skewness		-0.070		-1.063		-1.334		-1.578
Standard error of skewness		0.409		0.409		0.409		0.409
Kurtosis		-1.787		0.848		1.417		1.488
Standard error of kurtosis		0.798		0.798		0.798		0.798

Principal component analysis of the four dimensions of information system usage also indicates that this measure is unidimensional. The first variable is the only one to exceed 1, with a value of 2.801. This first component explains 70 per cent of the total variance.

The KMO (Kaiser-Meyer-Olkin) value highlights a strong correlation between the scale items, reaching a coefficient of 0.75. Furthermore, Bartlett's sphericity test is significant, thereby allowing us to reject the hypothesis that the correlations between items are weak or non-existent.

- Attitude towards the user

Table 14: Kurtosis coefficients for attitude towards the user.

	AEU1		AEU2	
Mean		1.788		1,000
Standard deviation		3.238		1,369
Skewness		2.025		-1.555

Standard error of asymmetry		0.409		0.409	
Kurtosis		4.461		1.201	
Standard error of kurtosis		0.798		0.798	

Principal component analysis of the two dimensions of attitude towards the user also indicates that this measure is unidimensional. Only the first variable exceeds 1, with a value of 1.970. This first component explains 98 per cent of the total variance.

The KMO (Kaiser-Meyer-Olkin) value indicates a significant correlation between the scale items, with a coefficient of 0.65. Furthermore, Bartlett's sphericity test is significant, thus allowing us to reject the hypothesis that the correlations between items are weak or non-existent.

- Perceived safety

Table 15: Kurtosis coefficients for perceived safety.

		SP1		SP2		SP3	
Mean		0.545		0.667		0.697	
Standard deviation		1.201		1.267		1.212	
Skewness		-1.323		-1.284		-1.616	
Standard error of asymmetry		0.409		0.409		0.409	
Kurtosis		0.842		0.737		1.582	
Standard error of kurtosis		0.798		0.798		0.798	

Principal component analysis of the three dimensions of perceived safety also indicates that this measure is unidimensional. The first variable is the only one to exceed 1,

with a value of 2.885. This first component explains 96 per cent of the total variance.

The KMO (Kaiser-Meyer-Olkin) value indicates a significant correlation between the scale items, with a coefficient of 0.785. Furthermore, Bartlett's sphericity test is significant, thereby allowing us to reject the hypothesis that the correlations between items are weak or non-existent.

By examining the values of the skewness and kurtosis coefficients presented in the tables, it can be concluded that the distribution of the items follows a normal distribution.

3.2.4. Evaluation of the measurement model (External model)

The evaluation of the measurement model will take place in three stages. Firstly, we will estimate reliability and internal consistency. Next, we will carry out a convergent validity analysis, followed by a discriminant validity analysis. This dual validity analysis will enable us to assess the strength of the relationships between the various latent variables and to interpret them, in accordance with the work of Peter and Churchill (1986)⁹.

3.2.5. Estimation of internal consistency reliability

As mentioned earlier in the section on methodology, we use Cronbach's alpha coefficient to ensure the reliability of the construct. In the previous stage, we verified the unidimensionality of the measurement scales used.

Table 16: Reliability analysis of items.

Variables	Number of items	Cronbach's α coefficient
Perceived usefulness	5	0.949
Perceived ease of use	6	0.844
Information system	4	0.852
Attitude towards the user	2	0.797

⁹ Cited by (Henseler et al. 2015)

Perceived safety	3	0.762
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Based on the findings of Hinton, Brownlow, McMurray and Cozens (2004), who suggest that a Cronbach's alpha coefficient between 0.70 and 0.90 indicates high construct reliability, it can be concluded that the variables demonstrate excellent reliability. In light of these findings, it can be stated that the reliability of our construct is fully supported by Cronbach's alpha.

3.2.6. Analysis of convergent validity

We examine the convergent validity of our model through 'factor loadings', 'composite reliability (CR)' and 'average variance extracted (AVE)'. The factor loadings were obtained using JASP (as illustrated in the figure below). As for composite reliability (CR) and AVE, these were calculated using an Excel spreadsheet, applying the two formulas previously mentioned in the 'Methodology' section.

Table 17: factor loadings, composite reliability and AVE

Variables	Items	Factor loading	Composite Reliability	AVE
Perceived usefulness	UP1	0.74	0.949	0.729
	UP2	0.78		
	UP3	0.76		
	UP4	0.80		
	UP5	0.84		
Perceived ease of use	FUP1	0.72	0.844	0.834
	FUP2	0.83		
	FUP3	0.87		
	FUP4	0.75		

	FUP5	0.88		
	FUP6	0.82		
Information system	MI1	0.74	0.852	0.729
	MI2	0.78		
	MI3	0.96		
	MI4	0.91		
Attitude	BI1	0.95	0.797	0.864
	BI2	0.94		
Perceived safety	CE1	0.76	0.762	0.594
	CE2	0.73		
	Year 3	0.81		

Drawing on the work of Hair et al. (2010)¹⁰, we assess the quality of most of our factor loadings as satisfactory.

With regard to composite reliability (CR), the same authors consider a value to be acceptable when the CR is 0.7 or higher. Thus, even the lowest CR value in our study — that for the 'perceived ease of use' variable — exceeds the acceptable threshold, standing at 0.805. In light of these results, we consider that all the variables in our construct demonstrate acceptable composite reliability.

Furthermore, the AVE value is considered acceptable when it lies between 0.5 and 0.7, and is regarded as very good at 0.7 or above (Hair et al., 2010)⁸¹. Thus, in our case, the AVE is assessed as follows:

Acceptable for the variables: 'perceived usefulness', 'perceived security', 'information system' Good for the variables: 'perceived ease of use', 'attitude'.

¹⁰ Cited by (Ghadi 2012)

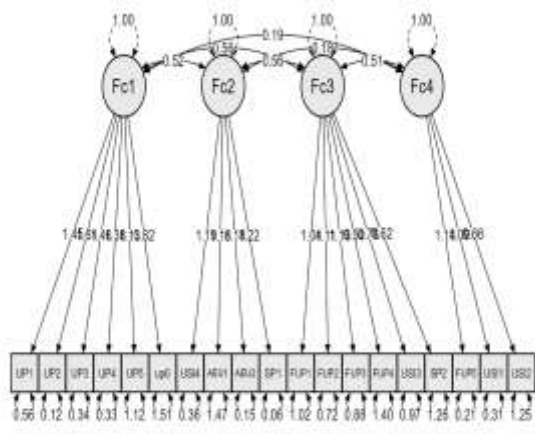


Figure 1: Factor loadings from the survey of senior managers – output from the JASP software.

3.2.7. Analysis of discriminant validity

In this section, we carry out two complementary analyses, namely: exploratory factor analysis and confirmatory factor analysis.

Comparing the results of the two analyses will enable us to conclude that discriminant validity exists.

- Exploratory factor analysis

Exploratory factor analysis (11) with oblique rotation (Promax) resulted in the extraction of four factors. Examination of the factor loadings, carried out using the JASP software, reveals that the measurement items exhibit significantly higher loadings with the variables assigned to them than with any other factor. Overall, most items show loadings well above 0.7, in line with the recommendations of (Gefen, 2005). However, some measurement variables have values below 0.7, notably AEU2 (0.692), FUP3 (0.573) and FUP4 (0.459).

Furthermore, the FUP1 and FUP2 indicators show significant loadings on factor 3, whilst the other measurement indicators for the same variable show significant loadings on factor 4.

Table 18: the component matrix extracted by PCA and Promax rotation.

Factor Loadings							
	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness		
UP1		0.978			0.097		
UP2		1.162			0.006		
UP3		0.844			0.232		
UP4		0.769			0.011		
UP5			0.977		0.059		
FUP1			1.036		0.036		
FUP2			0.967		0.005		
FUP3		0.573			0.021		
FUP4				0.459	0.052		
FUP5				0.925	0.244		
FUP6				0.922	-0.001		
USI1				0.889	-0.010		
USI2	1.051				0.145		
USI3	1.228				0.094		
USI4	0.921				0.015		
AEU1	0.820				0.011		

¹¹ In this analysis, loads below 0.4 were excluded.

AEU2		0.692						0.043	
SP1		0.758						0.112	
SP2		0.733						0.025	
SP3		0.834						0.053	
Note. The rotation method applied is Promax, with loadings greater than 0.4.									

Based on the exploratory analysis, we conclude that all the variables in our model possess discriminant validity, with the exception of the indicators for the ‘perceived ease of use’ variable.

Conclusion

The aim of this study was to identify and analyse the main determinants of the adoption of digital banking in Africa using the Technology Acceptance Model (TAM). Using a quantitative approach based on a survey of senior executives in the banking sector, several dimensions were examined, notably perceived usefulness, perceived ease of use, use of information systems, attitude towards use and perceived security.

The results show an overall favourable perception of digital technologies in the banking sector. In particular, respondents recognise their usefulness, ease of use and potential to improve professional practices. The statistical analyses carried out also demonstrate good reliability of the measurement instruments and generally satisfactory validity of the constructs studied.

These results thus highlight the importance of technological and perceptual factors in the adoption of digitalisation in banking. They also demonstrate the value of the TAM model for analysing the acceptance of technologies in the African banking context, whilst emphasising the need to take into account the specific characteristics of the context under study.

Ultimately, the success of the digital transformation of the banking sector depends not only on the availability of technologies, but also on how they are perceived, their ease of use and user confidence. Building digital skills, improving information systems and taking user expectations into account are therefore key factors in promoting the adoption of digital banking services.

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