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Merits of Adopting FinTech and their Impact on the Banks' Performance in the Least Developed Countries

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Abstract :

This study aims to investigate the effect of merits, competitive advantage, services development, financial advantage, and financial inclusion when adopting FinTech on banks' performance through a balanced scorecard; financial perspectives, customer perspectives, operation internal perspectives, and education and growth perspectives in Yemen as the case study. The data for this study was collected through a questionnaire distributed to 263 respondents at the managerial level of bank branches, consisting of 206 branches. Structural equation modeling through PLS, a disjoint two-stage approach, was used to approve the model's constructs. The study results reveal a positive significant impact of financial advantage, financial inclusion and competitive advantage on the performance of banks that adopt FinTech. But services development is having an insignificant impact on banks' performance. This study gives a clear picture of the main advantages of adopting FinTech in banks and its impact on the performance on the financial and non-financial sides.

Keywords: FinTech, Banks, Financial Inclusion, Competitive Advantage, Balanced scorecard, least developed countries

1. Introduction

FinTech is a topic that has recently received high and special attention from financial institutions and researchers. Digital FinTech technologies such as artificial intelligence, big data, cloud computing, the internet of things, and blockchain (Rubini, 2018) made a qualitative leap in providing financial services. Thus, these services were made accessible via a mobile phone. FinTech companies showed their services after the 2008 financial crisis (Wausups, 2017) based on modern digital technologies. FinTech services have attracted many clients looking forward to using technology in financial services, especially young people (Ferdiana & Darma, 2019). This is what made many financial institutions and banks, in particular, think of adopting FinTech and providing their services (C.-C. Lee et al., 2021). Those banks are considered the first houses of expertise in financial and banking services. Researchers have begun to give studies and research on adopting FinTech in banks. However, there is a very severe shortcoming in studies on knowing the impact of the advantages of FinTech adoption on banks' performance. Thus, the current study sets out to fill this research gap and provide a clear picture to banks about the advantages of adopting FinTech and its impact on performance.

Reducing costs and increasing profits is one of the most important goals that banks seek. The nature of the services provided by FinTech is when they are adopted in banks, where customers can conduct their financial transactions via mobile phone at anytime and anywhere (Putritama, 2019). This reduces many costs for banks, including that they do not need to open branches in areas where they are not located there (Varga, 2017), reducing the operating expenses of the branches (such as electricity, lighting, guarding, reducing the number of employees, and other costs), (LIEN et al., 2020) and (Wang et al., 2021). This, in turn, leads to increased profits. Also, FinTech services offered by banks attract many customers to conduct their financial transactions. Clients

also seek help in achieving their financial transactions through FinTech services due to the nature of it. Furthermore, it can be performed at anytime and anywhere, which increases the conduct of their financial transactions as well as increases market share, which in turn increases profits for banks (Singh et al., 2021).

Banks that provide FinTech services based on digital technologies have a competitive advantage over other traditional banks (Vives, 2017). In other words, banks that adopt FinTech provide modern and advanced financial services. This means that they make financial services accessible (Vučinić, 2020). It also saves customers time, effort, and money (Truong, 2016). Therefore, they do not need to go to a bank branch, as they can obtain financial services at anytime and anywhere through a mobile phone. All these advantages and others that customers obtain for using FinTech services banks provide them a competitive advantage over the rest of the traditional banks.

Many countries, especially developing countries, seek to raise the rate of financial inclusion in their countries. FinTech services are also considered as a success factor that increases the rate of financial inclusion (Arner et al., 2020). FinTech services provided via mobile phone applications issued by banks are downloaded to customers' phones to conduct financial transactions or through online platforms. Therefore, the financial operations that were carried out outside the banking sector are carried out in it (Demirgüç-Kunt et al., 2017). Also, the cash that was circulating outside the banking sector entered it (Srouji, 2020). In addition, society's disadvantaged and marginalized groups can easily access financial services through FinTech services carried out via mobile phones or online platforms, which are accessible to everyone (Friedline et al., 2020), as well as opening new bank accounts for new customers who want FinTech services. Therefore, FinTech services increase the financial inclusion rate, which positively affects the banks.

Among the advantages of adopting FinTech in banks is the provision of advanced and modern services based on modern digital technologies, which have revolutionized the world of financial services (Gomber et al., 2018). Including, but not limited to payment services through applications that work on customers' phones. It provides an automated advisor service that provides advisory services for asset management and investment (Belanche et al., 2019). Crowdfunding provides financing for projects that clients want to share with others in financing their projects (T. Lee & Kim, 2015). Providing credit analyses to customers who apply for loans using big data applications, which analyse financial and non-financial data for customers and determine their creditworthiness with accurate analyses (Leong et al., 2017). Analysing the consumption and periodic expenses of customers and providing important and useful advice and suggestions to customers, whether by investing in savings or other useful suggestions for customers by using artificial intelligence applications (Jakšič & Marinč, 2019). Also, it uses the services' information of customers' behavior, as determining the times of transaction, and the maximum amount, as well as it uses these data and information to analyses it automatically according to the status of each customer. Therefore, adopting FinTech in banks works to develop services.

The current study investigates the effect of FinTech merits on banks' performance when adopting FinTech in Yemen as the case study in the least developed countries. This study identifies that the FinTech merits consist of competitive advantage, services development, financial advantage, and financial inclusion which impact banks' performance. The performance of banks was measured by the balanced scorecard that has four perspectives: financial perspective, customer perspective, Operation internal perspective, and education and growth perspective. When reviewing previous studies, it is found that there is a shortage of studying the impact of FinTech merits on banks' performance. This research gap was addressed in this study. An academic view and an analytical process are presented to the merits that get banks from FinTech by identifying and evaluating the competitive advantage, services development, financial advantage, and financial inclusion characterized by the adoption of FinTech on banks' performance. This study aims to explore the impact of these merits of adopting FinTech on banks' performance, so the research seeks to achieve this goal.

This study uses a quantitative research methodology. The descriptive and causal modelling tests are used as methods, and the survey method involved a questionnaire for collecting data. This study follows the partial least square structural equation modeling PLS-SEM model. The study uses a hierarchical reflective-formative and disjoint two-step approach.

Through the previous results, it is noted that adopting FinTech in banks achieves advantages such as financial advantages, financial inclusion, and competitive advantages that have a positive impact on the performance of banks in general and on the perspectives of the balanced scorecard in particular. This is a strong incentive for banks to adopt FinTech.

Due to the scarcity of previous studies, the current study is considered one of the first studies that contribute to giving a clear picture of the main advantages of adopting FinTech in banks and their impact on performance- on the financial and non-financial side.

2. Review of literature

2.1 FinTech and theories

By looking at previous studies, it was found that researchers use some metrics and models to measure the performance of banks, including the CAMELS model, which was established in 1979 by the regulatory agencies in the United States of America. CAMELS model has six dimensions: capital adequacy, asset quality, management quality, profits, Liquidity, and Risk (Rozzani & Rahman, 2013). This model helps spot problems before they occur. Moreover, the PEAIS model mainly measures the main areas of financial performance operations such as asset protection and effective financial structures, asset quality, rates of return and costs, liquidity, and growth (Kasem et al., 2008). As well as the PATROL model, which is a monitoring tool for financial performance to give a clear picture of banks. This model has five components: capital adequacy, profitability, credit quality, organization (management), and liquidity (Brewer et al., 1994). Looking at the previous models, the researchers find that most of them focus on financial performance, as they give about what happened in the past. To measure banks' financial and non-financial performance, the balanced scorecard model is one of the most common models used in measuring performance. It has given the performance measurement for non-financial perspectives such as the customer, internal operations, and education and growth perspectives. The balanced scorecard model provides the possibility of translating a strategic vision of banks to more specific goals and indicators more accurately in measurement and focusing on the results in the short term in the organization's strategy for a long time. Therefore, the researchers used the balanced scorecard model in the current study.

Through the previous studies about the effect of adopting FinTech in banks on their performance, it is found that researchers use some measures, which are as follows:

1-The rate of return on assets and the rate of return on equity expresses the profitability measures. They are considered as the quantitative measures within indicators to measure financial performance as the studies by (Ky et al., 2019a), (Singh et al., 2021), (Le et al., n.d.), (Nguyen et al., 2021) and (Hasaka, 2019).

2-While some studies prefer to measure performance by setting up questionnaire questions as the studies by (Chen et al., 2021), (Dwivedi et al., 2021), (Chen et al., 2021) and (Al-Dmour et al., 2020).

According to (Kaplan et al., 2005), a balanced scorecard is a tool for measuring performance integrated and comprehensive for organizations. It is integrated into a set of financial and non-financial performance measures. The balanced scorecard consists of two perspectives that measure internal performance (operations internal perspective, education, and growth perspective) and two external performance perspectives (financial perspective, and customers' perspective) through information exchanged between the four perspectives.

2.2 Conceptual Framework and Research Hypothesis

2.2.1 Financial Advantage

The financial advantages are represented in increasing profits and reducing costs. Studies (Wang et al., 2021), (Vijai, 2019), (Ky et al., 2019b) and (Singh et al., 2021) indicate that banks that provide FinTech services increase their profits due to the attraction of many customers to FinTech services. They save their time, effort, and money (Teigland et al., 2018). Thus, banks increase their market share, which leads to increased profits. Adopting FinTech in banks reduces costs, so banks do not need to open branches for banks where they are not located there (Varga, 2017) and also reduces expenses for the banks (LIEN et al., 2020) and (Wang et al., 2021). FinTech services can be used via mobile phone which makes the customers use FinTech services anytime and anywhere. Therefore, customers do not need to go to bank branches. Increasing profits and reducing costs directly affect the performance of banks. So, this study hypothesized the following:

H1: There is a statistically significant positive impact of financial advantage on banks' performance when adopting FinTech, a field of study.

H1a- H1d: There is a statistically significant positive impact of financial advantage on banks' performance perspectives (H1a Financial Perspectives, H1b Customer Perspectives, H1c Operation internal Perspectives, and H1d Education and growth Perspectives) when adopting FinTech, a field of study.

2.2.2 Competitive Advantage

Some studies such as (Dwivedi et al., 2021), (Zhao et al., 2019), (I. Lee & Shin, 2018) and (Kou et al., 2021) consider the competitive advantage is one of the advantages of FinTech because the competitive advantage provides unique services that other banks do not. Given the importance of competitive advantage in increasing the market share and increasing profitability, banks seek to achieve the highest profitability. Some studies have also shown the role of competitive advantage in performance, such as (Tarabieh et al., 2020) and (Kamukama et al., 2017). Thus, this study hypothesized the following:

H2: There is a statistically significant positive impact of competitive advantage on banks' performance when adopting FinTech, a field of study.

H2a- H2d: There is a statistically significant positive impact of competitive advantage on banks' performance Perspectives (H2a Financial Perspective, H2b Customer Perspective, H2c Operation internal Perspective, and H2d Education and growth Perspective) when adopting FinTech, a field of study.

2.2.3 Financial Inclusion

Most studies confirm the important role played by FinTech in financial inclusion, which considers one of its advantages (Jack & Suri, 2011), (Ghosh, 2016), (Gosavi, 2018) and (Tchamyou et al., 2019), where financial technology facilitates the use of financial services and makes them accessible through the mobile phone. The studies by (Morawczynski, 2009), (Jack & Suri, 2011) and (Ouma et al., 2017) also show that individuals or companies that have a cash account via a mobile phone tend to deal with banking, such as receiving, sending, and transferring money. The studies by (F. H. Shihadeh et al., 2018), (Kumar et al., 2021) and (F. Shihadeh, 2020) show an association between financial inclusion and the performance of banks. Therefore, the hypotheses of the study are as follows:

H2: There is a statistically significant positive impact of financial inclusion on banks' performance when adopting FinTech, a field of study.

H2a- H2d: There is a statistically significant positive impact of financial inclusion on banks' performance perspectives (H2a Financial Perspective, H2b Customer Perspective, H2c Operation internal Perspective, and H2d Education and growth Perspective) when adopting FinTech, a field of study.

2.2.4 Services Development

Studies by (Teigland et al., 2018) and (LIEN et al., 2020) show that FinTech services make it easier for customers to obtain financial services using the latest possible digital, as they provide successful digital alternatives to customers. Through FinTech services, customers can conduct financial transactions via mobile phones at anytime and anywhere (Anshari et al., 2019). FinTech services have also achieved essential advantages for customers, such as reducing customers' effort, time, and money (Zhang & Kim, 2020) and (Ryu, 2018)(Kim et al., 2015). Therefore, FinTech services work to meet the aspirations of customers and achieve their satisfaction (Alwi et al., 2019) and (Chen et al., 2021). Thus, banks that provide FinTech services are developing their services, which play an essential role in attracting customers and increasing market share. So, this study hypothesized the following:

H2: There is a statistically significant positive impact of services development on banks' performance when adopting FinTech, a field of study.

H2a- H2d: There is a statistically significant positive impact of services development on banks' performance perspectives (H2a Financial Perspective, H2b Customer Perspective, H2c Operation Internal Perspective, and H2d Education and growth Perspective) when adopting FinTech, a field of study.

3 Methods of the Study

3.1 Collection of Data

This study uses a quantitative research method; the descriptive and causal modeling tests were used as the methods for this study. The survey method was used through a questionnaire for collecting data. The questionnaire consists of a 33-item instrument quantifying respondents that Competitive Advantage, Services development, Financial Advantage, and Financial Inclusion to measure the merits of adopting FinTech. At the same time, Financial Perspectives, Customer Perspectives, Operation internal Perspectives, and Education and growth Perspectives measure the banks' performance via balanced scorecard perspectives.

The questionnaire was presented to 5 main banks which have 206 branches that provide FinTech payments in Yemen. Many professors at the commerce department, Dr. Babasahab Ambedkar Marathwada University – Aurangabad, India, and the professors at the Colleges of Commerce and Management at Sana'a and Thamar Universities in Yemen have reviewed the questionnaire. The questionnaire was distributed to the managerial level of bank branches, consisting of branch manager, deputy branch manager, Customer Services Officer, and banking transaction officer. By using a stratified random sampling method, the sample size dependent on stratum size for every bank was taken because the sizes of banks are different from one bank to another according to the number of branches. The number of branches leads to the spread of bank services to a more significant segment of people. The study population is 824 questionnaires for five main banks which have 206 branches that provide FinTech payments in Yemen. We sent 310 valid questionnaires, 37.6% to the population of the study, while 263- 23% have returned to be analyzed in this study, dependent on the size of the banks.

3.2 Statistics methodology

In this article, the SEM model is followed by the researcher as it was suggested by (Anderson & Gerbing, 1988). It is an incredible strategy that is presented to test and estimate 'multivariate causal connections' (Fan et al., 2016). Smart PLS 3.3.3 is used to form SEM to examine the model that is suggested. PLS is utilized in its broad sense in IS research (Geijteman & Mevius, 2016), (Urbach & Ahlemann, 2010) and (Henseler et al., 2016). There is no doubt about the diffusion of factors that ensures rational systematic accuracy (Urbach & Ahlemann, 2010). Also, it is a valuable model used in an investigation that is intricate with some constructs and pointers (Urbach & Ahlemann, 2010) and (Nitzl & Chin, 2017). It contains two normal related models i.e., the measurement model and the Structural Model.

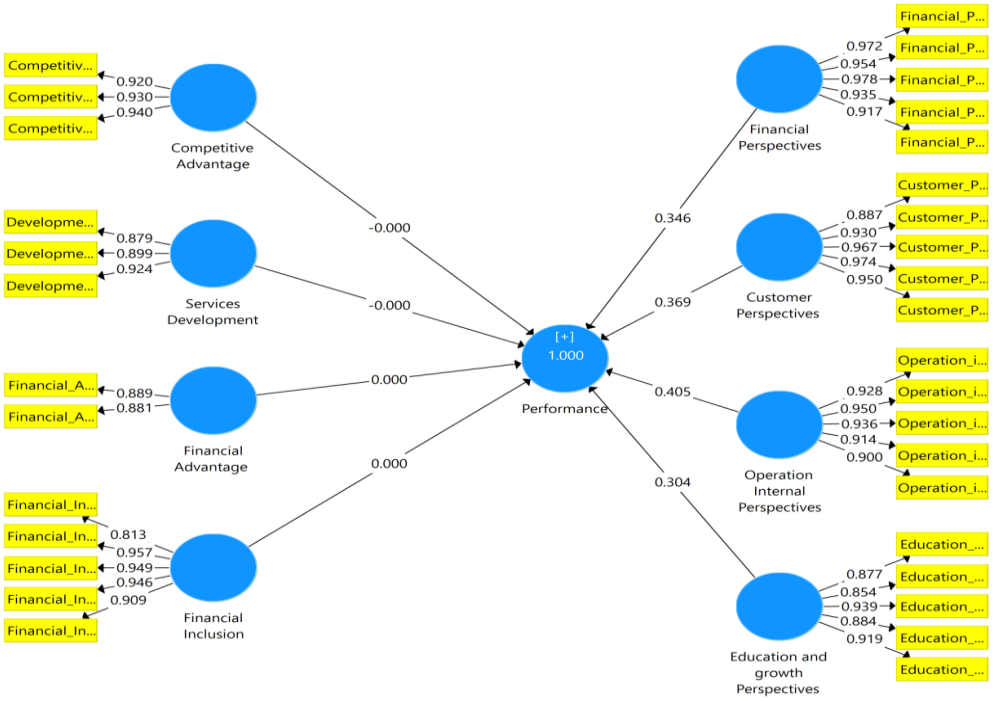

Fig.1 A diagram indicates to repeated indicator approach, Reflective-Formative.

The reflective formative technique cannot employ the repeated indicator approach in the second order, where $R^2 = 1.00$ and path coefficient = 0.000. It should apply the two-stage method or extend on the repeated indicator approach (Sarstedt, Hair, et al., 2019). In the current investigation, the $R^2 = 1.00$ and the path coefficient = -0.000 when applying the repeated indicator approach as shown in Figure 1. So, for this investigation, we adopted a disjoint two-stage approach. Moreover, mode-B is the measuring mode because of the second-order formative construct and not an equal number of indicators in lower-order reflective constructs (Becker et al., 2012) and (Ali et al., 2018).

According to the rules followed, the second-order construct is not shown in the conceptual model (Sarstedt, Hair, et al., 2019) and (Joseph F Hair et al., 2019). As seen in Figure 2, the two-step technique, the necessary step is for estimating the measurement model without a second-order construct. Step two involves calculating the latent variable scores and adding them to the original data file. Lower-order constructs are used as indications of the second-order construct i.e., is consequently a lower-order construct (Becker et al., 2012). Before the final structural model evaluation, the reliability and validity of all constructs are re-established (Sarstedt, Hair, et al., 2019) and (Joseph F Hair et al., 2019).

3.3 Measures

As independent variables in this study, the questionnaire employed eight variables: Competitive Advantage, Services development, Financial Advantage, and Financial Inclusion, as independent variables. Simultaneously, the four variables as dependent variables represent balanced scorecard perspectives as Financial Perspectives, Customer Perspectives, Operation internal Perspectives, and Education and growth Perspectives (Rubini, 2018), (Nicoletti et al., 2017), (Alam et al., 2019) and (Romānova & Kudinska, 2016). The survey instrument and assessment scales were adjusted to assess the advantage of FinTech adoption on banks (Hu, 2019), (Jaradat & Twaissi, 2010) and (Fernando, 2018). The characteristics in the study were measured using a five-point Likert-type scale ranging from "strongly disagree" to "strongly agree, and five questions utilizing nominal scales on the participants' demographic information (Gender, Job, Years of Experience, Scientific Level, and Specialization).

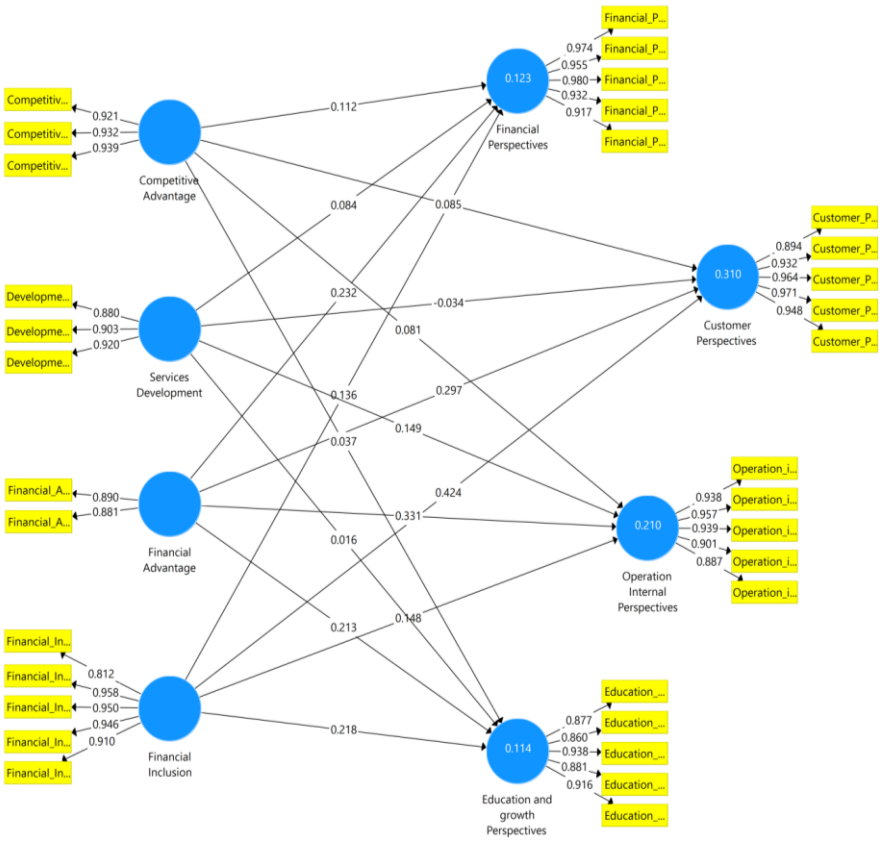

Fig.2. A diagram indicates the measurement model for lower-order constructs (Step -1)

4 Analysis and results

4.1 Analysis of Data

Table 1 shows the demographics of the final data which was 263 respondents. According to, (Comrey & Lee, 1992) and (Joseph F Hair et al., 2010), a critical sample size of more than 200 is sufficient for giving statistical power to data analysis. As a consequence, the 263 sample size acquired from this investigation is enough for data analysis. The path model is measured by measurement and structural model. In this study, the disjoint two-stage technique is used with Mode B for the second-order formative construct (Becker et al., 2012).

4.2 Descriptive Statistics

We measured the study sample demographic information, Gender, Job, Years of Experience, Scientific level, and specialization. The total respondents are 263; the males are 87.1%, while females are 12.9%. The respondents are 41.1% in 1–5 years, 29.3% in 6–10 years, 5.9% in 11-15 years, and above 16 years is 24% of the experiences. The respondents who have a bachelor's degree is 90.5%. The respondents who have an accounting specialization 24%, while the remaining percentage for other specializations.

Table .1. Profile of respondents (N=263)

Factor	Number	%
Gender		
Male	229	87.1
Female	34	12.9
Job		
Manager of Branch	25	9.5
Deputy Manager	34	12.9
Customer Services Officer	110	41.8
Banking Transactions Officer	54	20.5
Others	40	15.2
Years' Experience		
From 1 to 5 years	108	41.1
From 6 to 10	77	29.3
From 11 to 15 years	15	5.7
above 16 years	63	24.0
Scientific level		
Secondary school	9	3.4
Diploma After High school	11	4.2
Bachelor	238	90.5
Master	5	1.9
Specialization		
Management	48	18.3
Accounting	63	24.0
Banking & Finance	25	9.5
Computer science	40	15.2
Others	87	33.1
Total	**263**	**100.0**

4.3 Measurement model of lower-order reflective constructs.

The first step in the disjoint two-stage technique is to perform reliability and validity tests on the lower-order reflective construct measurement model (Joseph F Hair Jr et al., 2021). Internal consistency reliability is measured by using Cronbach's alpha and composite reliability values. Values of Cronbach's alpha for the four lower-order constructions are shown in Table 2. It is shown with a threshold value of 0.7. Composite reliability ratings are likewise more than 0.7. It is suggested that the reliability measurements are acceptable (Urbach & Ahlemann, 2010). Factor loadings and AVE (average variance explained) are used to examine convergent validity (Cooper & Schindler, 2014). Convergent validity is demonstrated when all factor loadings overtake the

acceptable value of 0.70 (Field, 2013). Table 2 shows all AVE values are more than the suggested value of 0.5 (Joseph F Hair Jr et al., 2021). The HTMT (Heterotrait-Monotrait ratio) values in Table 4 are less than the suggested value of 0.85 (Joe F Hair Jr et al., 2020). Therefore, the model of the study has no issues with discriminant validity.

Table 2. Result of measurement model -Convergent validity

Latent variable	**Item No**	**loadings**	**α>0.7**	**CR>0.7**	**AVE> 0.5**
Financial Perspectives	Fin_Per1	0.974	0.974	0.980	0.906
	Fin_Per2	0.955			
	Fin_Per3	0.980			
	Fin_Per4	0.932			
	Fin_Per5	0.917			
Customer Perspectives	Cus_Per1	0.894	0.968	0.975	0.888
	Cus_Per2	0.932			
	Cus_Per3	0.964			
	Cus_Per4	0.971			
	Cus_Per5	0.948			
Operation Internal Perspectives	Ope_Per1	0.938	0.958	0.967	0.855
	Ope_Per2	0.957			
	Ope_Per3	0.939			
	Ope_Per4	0.901			
	Ope_Per5	0.887			
Education and growth Perspectives	Edu_Per1	0.877	0.938	0.953	0.801
	Edu_Per2	0.860			
	Edu_Per3	0.938			
	Edu_Per4	0.881			
	Edu_Per5	0.916			
Competitive Advantage	Com_Adv1	0.921	0.925	0.951	0.866
	Com_Adv2	0.932			
	Com_Adv3	0.939			
Services development	Dev_Ser1	0.880	0.886	0.928	0.812
	Dev_Ser2	0.903			
	Dev_Ser3	0.920			
Financial Advantage	Fin_Adv1	0.890	0.724	0.879	0.784
	Fin_Adv2	0.881			
Financial Inclusion1	Fin_Inc1	0.812	0.952	0.963	0.840
	Fin_Inc2	0.958			
	Fin_Inc3	0.950			
	Fin_Inc4	0.946			
	Fin_Inc5	0.910			

The study supported a precise discriminant validity test by comparing AVE values with the square of the estimation of the correlation for any two Advantages. Competitive Advantage, Services development, Financial Advantage, Financial Inclusion, Financial Perspectives, Customer Perspectives, Operation internal Perspectives, and Education and growth Perspectives are greater than the squared correlation estimates.

Table .3. The outcome of measurement model - Latent variables correlation

	Competitive Advantage	Customer Perspectives	Services development	Education and growth Perspectives	Financial Advantage	Financial Inclusion	Financial Perspectives	Operation Internal Perspectives
Competitive Advantage	**0.931**							
Customer Perspectives	0.148	**0.942**						
Services development	0.179	0.159	**0.901**					
Education and growth Perspectives	0.079	0.236	0.119	**0.895**				
Financial Advantage	0.073	0.359	0.090	0.247	**0.885**			
Financial Inclusion	0.113	0.463	0.356	0.258	0.139	**0.917**		
Financial Perspectives	0.159	0.275	0.173	0.218	0.267	0.211	**0.952**	
Operation Internal Perspectives	0.149	0.411	0.246	0.430	0.371	0.256	0.327	**0.925**

Table 4. Heterotrait-Monotrait Ratio (HTMT)

	Competitive Advantage	Customer Perspectives	Services development	Education and growth Perspectives	Financial Advantage	Financial Inclusion	Financial Perspectives	Operation Internal Perspectives
Competitive Advantage								
Customer Perspectives	**0.153**							
Services development	**0.198**	**0.164**						
Education and growth Perspectives	**0.085**	**0.245**	**0.122**					
Financial Advantage	**0.089**	**0.427**	**0.114**	**0.293**				
Financial Inclusion	**0.121**	**0.476**	**0.381**	**0.276**	**0.164**			
Financial Perspectives	**0.164**	**0.283**	**0.183**	**0.222**	**0.318**	**0.216**		
Operation Internal Perspectives	**0.140**	**0.417**	**0.262**	**0.458**	**0.432**	**0.257**	**0.327**	

Table 5. Result of measurement model - Cross Loadings

	Competitive Advantage	Customer Per	Services development	Education Per	Financial Advantage	Financial Inclusion	Financial Per	Operation Per
Com_Adv1	**0.921**	0.104	0.139	0.070	0.052	0.109	0.150	0.072
Com_Adv2	**0.932**	0.145	0.208	0.024	0.088	0.132	0.127	0.112
Com_Adv3	**0.939**	0.155	0.157	0.111	0.064	0.084	0.163	0.199
Cus_Per1	0.104	**0.894**	0.127	0.195	0.428	0.418	0.265	0.362
Cus_Per2	0.160	**0.932**	0.098	0.190	0.347	0.395	0.241	0.409
Cus_Per3	0.126	**0.964**	0.179	0.257	0.320	0.463	0.283	0.415
Cus_Per4	0.137	**0.971**	0.179	0.261	0.307	0.465	0.271	0.403
Cus_Per5	0.174	**0.948**	0.163	0.206	0.282	0.435	0.232	0.343
Dev_Ser1	0.164	0.116	**0.880**	0.066	0.022	0.299	0.138	0.186
Dev_Ser2	0.151	0.105	**0.903**	0.039	0.115	0.295	0.160	0.229
Dev_Ser3	0.169	0.191	**0.920**	0.187	0.097	0.356	0.167	0.242
Edu_Per1	0.126	0.246	0.054	**0.877**	0.289	0.191	0.354	0.401
Edu_Per2	0.053	0.182	0.056	**0.860**	0.330	0.156	0.236	0.364
Edu_Per3	0.047	0.236	0.170	**0.938**	0.176	0.300	0.153	0.401
Edu_Per4	0.052	0.179	0.126	**0.881**	0.130	0.274	0.107	0.365
Edu_Per5	0.075	0.204	0.134	**0.916**	0.156	0.239	0.095	0.390
Fin_Adv1	0.055	0.329	0.124	0.218	**0.890**	0.144	0.246	0.329
Fin_Adv2	0.074	0.307	0.034	0.220	**0.881**	0.101	0.227	0.328
Fin_Inc1	0.152	0.479	0.303	0.193	0.139	**0.812**	0.249	0.294
Fin_Inc2	0.111	0.420	0.326	0.225	0.128	**0.958**	0.152	0.206
Fin_Inc3	0.068	0.427	0.322	0.253	0.143	**0.950**	0.191	0.231
Fin_Inc4	0.119	0.426	0.372	0.235	0.149	**0.946**	0.171	0.253
Fin_Inc5	0.053	0.344	0.298	0.279	0.067	**0.910**	0.192	0.167
Fin_Per1	0.185	0.257	0.172	0.194	0.267	0.212	**0.974**	0.302
Fin_Per2	0.151	0.262	0.162	0.194	0.246	0.192	**0.955**	0.325
Fin_Per3	0.170	0.261	0.177	0.173	0.260	0.201	**0.980**	0.308
Fin_Per4	0.105	0.260	0.105	0.228	0.256	0.183	**0.932**	0.310
Fin_Per5	0.141	0.270	0.200	0.255	0.242	0.215	**0.917**	0.314
Ope_Per1	0.165	0.390	0.259	0.404	0.416	0.276	0.374	**0.938**
Ope_Per2	0.173	0.453	0.221	0.358	0.401	0.266	0.357	**0.957**
Ope_Per3	0.136	0.426	0.218	0.404	0.332	0.237	0.314	**0.939**
Ope_Per4	0.094	0.304	0.225	0.416	0.252	0.192	0.209	**0.901**
Ope_Per5	0.094	0.288	0.208	0.430	0.266	0.186	0.205	**0.887**

4.4 Measurement model of higher-order formative constructs.

The second-order construct is produced by using the disjoint two-stage technique by summing the latent variables' scores of lower-order reflective constructs. It is calculated by SMART-PLS without including the higher-order construct, as markers of higher-order constructions at a lower level (Becker et al., 2012). The second step investigates the second-order formative construct for its measurement model and structural model analysis (Sarstedt, Hair Jr, et al., 2019) (Joseph F Hair et al., 2019). The second-order construct is regarded as a lower-order formative construct at this level with multicollinearity and outer weights studied in its measurement model (Becker et al., 2012). The VIF (Variance Inflation Factor) of each indicator (formative construct) is shown in Table 6 (J F Hair et al., 2010). The assessment and relevance of the formative construct's outer weights are influenced by multicollinearity (Joseph F Hair Jr et al., 2021). Table 6 shows that all VIF values are much lower than the threshold level of 5. The VIF of this study is lower than 2, which means that this result is more accurate. As a result of the study, there is no indication of multicollinearity. Then, the bootstrapping approach with 5,000 sub-samples is used to determine the relevance of outer weights. The over weights are the standardized multiple regression coefficients that show the relative relevance of the concerned indicator for the formative construct (Joseph F Hair Jr et al., 2021). Table 6 presents the levels and relevance of the four formative construct indicators' outer weights. Each one of the four indicators is noticeable in its own right (p-value 0.05). As a result, the present research looks at the measuring model.

Table 6: Higher-order constructs validity

HOC	LOC	Outer Weight	Mean	T statistics	P-value	VIF
performance	Financial Perspectives	0.225	0.226	2.534	**0.011**	**1.158**
	Customer Perspectives	0.666	0.653	7.290	**0.000**	**1.240**
	Operation Internal Perspectives	0.245	0.244	2.078	**0.038**	**1.460**
	Education and growth Perspectives	0.227	0.225	2.151	**0.032**	**1.242**

4.5 Structural model

After checking the structural model of validity and reliability scale, the next step is to evaluate the structural model which involves hypothesis testing, R^2, Q^2 predictive significance, effect size (f^2), and model fit (Memon & Rahman, 2014)**.**

4.5.1 Hypotheses testing

This article's hypotheses were tested by using (β-value, t-value, and p-value) with a sub-samples 5000. In the model that illustrates the route coefficients in Fig.3, the linkages between the constructs were T and P values were utilized to determine the way coefficients (β) values are in a clear and provable manner (i.e., at $p<0.05$,$p<0.01$, or $p<0.001$).

Table 7: Structural model (Path coefficient of research hypothesis)

Hyp	Relationship	Std. Beta	Standard Error	T Values	P Values
H1	Competitive Advantage -> Performance	0.109	0.049	2.231	**0.026**
H2	Services development -> Performance	0.039	0.060	0.647	0.517
H3	Financial Advantage -> Performance	0.380	0.057	6.624	**0.000**
H4	Financial Inclusion -> Performance	0.398	0.065	6.135	**0.000**

Note: Significance at: *p< 0.05, **p< 0.01 and ***p< 0.001

H	Relationship	Std. Beta	Standard Error	T Values	P Values
H1a	Competitive Advantage -> Customer Perspectives	0.085	0.049	1.729	0.084
H1b	Competitive Advantage -> Education and growth Perspectives	0.037	0.064	0.574	0.566
H1c	Competitive Advantage -> Financial Perspectives	0.112	0.055	2.052	**0.041**
H1d	Competitive Advantage -> Operation Internal Perspectives	0.081	0.055	1.488	0.137
H2a	Services development -> Customer Perspectives	-0.034	0.064	0.53	0.596
H2b	Services development -> Education and growth Perspectives	0.016	0.075	0.208	0.836
H2c	Services development -> Financial Perspectives	0.084	0.062	1.353	0.177
H2d	Services development -> Operation Internal Perspectives	0.149	0.071	2.105	**0.036**
H3a	Financial Advantage -> Customer Perspectives	0.297	0.051	5.83	**0.000**
H3b	Financial Advantage -> Education and growth Perspectives	0.213	0.063	3.367	**0.001**
H3c	Financial Advantage -> Financial Perspectives	0.232	0.062	3.736	**0.000**
H3d	Financial Advantage -> Operation Internal Perspectives	0.331	0.058	5.711	**0.000**
H4a	Financial Inclusion -> Customer Perspectives	0.424	0.062	6.829	**0.000**
H4b	Financial Inclusion -> Education and growth Perspectives	0.218	0.066	3.313	**0.001**
H4c	Financial Inclusion -> Financial Perspectives	0.136	0.069	1.974	**0.049**
H4d	Financial Inclusion -> Operation Internal Perspectives	0.148	0.068	2.175	**0.030**

Table .8. **R Square & Q Square**

	Model Values	
SRMR Value	0.051	
Construct	**R^2**	**Q^2**
Performance	0.389	0.166

R Square: above 0.10

Q Square: should be above 0.000

Fig.3. Step two of the disjoint-two stage approach

4.5.2 Assessing R^2 and predictive relevance Q^2

This study must estimate R^2 predictive relevance of Q^2, and R^2 to the diversity in the reliant variable (DV) that free factor/s (IVs) clarity. As shown by (Fan, 2016), the dependent variable is 0.389, which indicates that the influence of the independent factors in this study is modest, see table 8 and figure3. The inconsiderate approach in PLS 3 is used to test the predictive relevance of Q^2. The cut-off point for Q^2 is greater than zero which indicates that the model's goal is predictive (Joe F Hair et al., 2011). Table 8 shows that the Q^2 value of FinTech adoption is 0.166 >0. The model's predictive supporting relevance is to the latent endogenous variables. Predictive relevance Q^2 Use blindfolding to get cross-validated redundancy metrics for each component obtaining Q^2 estimates greater than zero which demonstrates that the exogenous constructions have predictive value for the endogenous construct under discussion (Joe F Hair et al., 2011).

4.5.3 Assessing the model fit

The last step is to compute the model foot. The model fit assessment in PLS has been carried out utilizing the following:

The model's Goodness of Fit (GoF) :

Via (Hair et al., 2011), it is demonstrated how the chosen model replicates the observed covariance structure among the marker items using the model Goodness of Fit (GoF). In the current investigation, the file is created as a general percentage of the model, i.e., the estimate and underlying PLS models. The model's predicted execution is solely estimated (Vinzi et al., 2010). In PLS, there is no such thing as a global fit measure. However, scientists suggest a global GOF that is defined as the mathematical mean of both the normal of AVE and the normal of R2 for endogenous (Tenenhaus et al., 2005), calculated using the simultaneous equation:

$$GoF = \sqrt{\left(\overline{R^2} \times \overline{AVE}\right)}$$

The GoF requirements are as follows: Not fit, small, medium, or big have by (Wetzels, 2009): GoF 0.1 indicates that there is no fit, GoF between 0.1 and 0.25 indicates a trim fit, GoF between 0.25 and 0.36 indicates a medium fit, and GoF more than 0.36 indicates an oversized fit. The current research comprises GoF = 0.454, which is more than 0.36 and reflects a high value.

$\underline{AVE}$ = 0.844 , $\underline{R^2}$ = 0.389

$GoF = \sqrt{(0.844 \times \ 0.389)}$ = 0.454

Standardized Root Mean Square Residual (SRMR):

Standardized Root Mean Square Residual (SRMR) is determined using a cut-off estimate of less than or equal to 0.08 (Henseler et al., 2016). Using PLS 3, the SRMR in this study is 0.051, which is not precisely the cut-off esteem decided in writing.

5 Discussions

Competitive Advantage (H1). The hypothesis displays that competitive advantage influences the banks' performance when adopting FinTech. The result of the hypothesis (H1) is Competitive Advantage → Banks' Performance (β = 0.109, P= 0.026). There is a significant positive effect of Competitive Advantage on the Banks' Performance. This explains that banks get a competitive advantage over other banks when adopting FinTech. The banks that provide FinTech financial services reach many customers in areas with no bank branches. Customers can conduct their financial transactions through mobile phones, using applications or digital wallets issued by banks to their customers to conduct their financial operations. This is what attracts many customers, and for this reason, banks have a competitive advantage over other banks. Thus, the competitive advantage increases the performance of banks. Subsequently, some studies support this result, e.g. (Subanidja et al., 2022).

The hypothesises (H1a-H1d) are a significant positive effect of the competitive advantage on Financial Perspectives only. This means the competitive advantage has a direct impact on the financial perspective.

Services Development (H2). The results for the development of the services indicate that it is insignificant at (p,0.05). The hypotheses (H2) are rejected and show no significant effect for the Services development of adopting FinTech on banks' performance. This clarifies that the adoption of FinTech in banks works to develop financial services, as customers get advantages for these services, including access to services at any time and place, as well as reducing time, effort, and money for customers. This is what meets the aspirations of customers. As for the impact of services development on the performance of banks, through the results, it is clear that there is no significant effect on the performance of banks, and the reason may be that FinTech services provided by banks through digital wallets issued by banks to customers to conduct their financial transactions are still in their early stages. This did not pass more than three years and maybe also the reason customers do not use these services significantly.

Financial Advantage (H3). The results for the financial advantage on effects of banks' performance (β = 0.380, P= 0.000). The results indicate significant positive path coefficients signifying influence between Financial Advantage and bank performance. That means the financial advantages of adopting FinTech in banks have a positive impact on their performance. This is the highest value among the rest of the variables, which reflects the significant impact of the financial advantage represented in increasing profitability and reducing costs on the performance of banks. The advantage of adopting FinTech on banks is reducing costs that help banks to achieve higher profitability, provide competitive services, and increase efficiency. As well as the financial advantage in obtaining higher profits leads to the distribution of increased profits to shareholders and owners and the rise in the price of shares.

The hypothesises (H3a-H3d) are a significant positive effect on the financial advantage from all perspectives. Therefore, some studies support this result, e.g. (Aluri & Palakurthi, 2011) and (Salleh & Ibrahim, 2011).

Financial Inclusion (H4). A significant positive effect is found between financial inclusion and banks' performance (H4) as a result (β = 0.398, P= 0.000). This indicates that financial transactions carried out outside the banking sector are entered into it. Also, the liquidity circulating outside the sector enters the banking sector. Also, disadvantaged people of financial services can access the financial FinTech services that can be obtained through mobile phones. Therefore, banks benefit from entering financial transactions into the banking sector,

leading to increase revenues and increase profits. As for the financial liquidity that takes place outside the banking sector and the intervention of the banking sector helps the banks invest and provide loans and other services that bring good benefits to the banks. The groups deprived of financial services can obtain that through FinTech services, which lead to increasing the bank's market share and attracting new customers. All of these factors have a positive impact on the performance of banks.

The hypothesises (H4a-H4d) indicate a significant positive effect of financial inclusion on all perspectives. This means that financial inclusion directly impacts all perspectives of a balanced scorecard of banks' performance.

6 Conclusion

The study examines the impact of the advantages of adopting FinTech in banks on their performance. The balanced scorecard was used to measure the banks' performance from its four perspectives. The study also used four advantages of adopting FinTech in banks (financial advantages, competitive advantage, financial inclusion, and service development).

The study results reveal a significant positive effect of financial advantages on the performance of banks. Where financial advantages are considered the most significant variables influencing the rest of the variables and came first. Financial advantages are represented in increasing profits and reducing costs which is one of the goals that most banks seek. The results show a significant positive effect of financial inclusion on the performance of banks. All of the factors of financial inclusion, which are carried out through the adoption of FinTech in banks have a positive impact on their performance.

The study results indicate a significant positive effect of financial advantages and financial inclusion on all balanced scorecard perspectives. This shows that banks that adopt FinTech get financial advantages and financial inclusion that affect their financial and non-financial performance. Such as increasing net profits from a financial perspective, increasing the market share through the customer perspective, operating profit through the operations internal perspective, and improving education and developing human capital skills, which leads to the increased growth of banks.

The results also reveal a positive significant impact of the competitive advantage on the performance of banks. This gives banks that adopt FinTech a competitive advantage over the rest of the banks, and a positive impact on their performance in general and on the financial perspective in particular.

Appendix A

Constructs	Indicator and item	Sources
Balanced scorecard Financial Perspective	The bank’s adoption of financial technology leads to an increase in market share.	(Owusu, 2017)
	The Bank seeks to adopt FinTech services to reduce expenses to a minimum.	
	The bank's adoption of financial technology leads to higher revenue from new services.	
	The bank's adoption of financial technology leads to maximizing shareholders' wealth.	
	The bank seeks by providing financial technology services to achieve higher productivity and thus increase profits	
Customer Perspective	The bank seeks to improve the quality of its services to meet the wishes and needs of customers.	(Owusu, 2017)
	The Bank treats complaints submitted by customers with great care.	
	The bank lowers the price of the service provided compared to the competitive market price.	

	The bank aims to increase the number of customers from year to year.	
	The Bank seeks to retain existing customers by responding to their needs.	
Operation internal Perspectives	The bank reduces the time to complete the work.	(Owusu, 2017)
	The Bank seeks to make optimal use of the available resources.	
	The bank works to reduce routine and inappropriate repetition at work	
	The bank trends to digital technology to get rid of paperwork.	
	The bank seeks to increase the level of quality of services.	
education and growth perspective	The Bank is keen to hold qualitative training courses for its employees to keep pace with the era of digital technology.	(Owusu, 2017)
	The Bank is keen to update the technology used constantly.	
	The Bank seeks to develop employees' skills and improve the use of modern technologies according to the era of digital technology.	
	The bank is keen to continue to develop its creativity and to reserve a higher place among banks.	
	The Bank is constantly improving and developing its services.	
Competitive Advantage	Bank services that adopt financial technology reach many clients in regions where there are no bank branches.	(Subanidja et al., 2022)
	Banks that adopt FinTech attract many clients.	
	Increased competition for banks to adopt financial technology leads to financial stability.	
Services development	FinTech offers successful digital alternatives that reduce costs, time, and effort for clients.	(Zhang & Kim, 2020) (Anshari et al., 2019)
	The adoption of financial technology helps to meet the aspirations and desires of clients.	
	The adoption of financial technology helps banks to provide most financial and banking services anytime and anywhere.	
Financial Advantage	Using the services provided by financial technology increases the profits of the banks.	(Varga, 2017)
	Adoption of FinTech in banks helps to reduce costs and expenses.	
Financial Inclusion	The bank's adoption of FinTech helps in reaching a segment of potential customers who live in rural areas.	(Arner et al., 2020) (Friedline et al., 2020)
	The bank’s adoption of FinTech services helps in reaching disadvantaged and marginalized groups of banking services.	
	The bank’s adoption of FinTech helps to attract a more significant number of females to use banking financial services.	
	The bank's adoption of FinTech helps to provide financial and banking services to the low-income group	
	The bank's adoption of FinTech encourages customers to carry out their financial transactions and obligations through mobile phones.	

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