International Journal of Commerce and Management Research
ISSN: 2455-1627
Impact Factor: RJIF 5.22
www.managejournal.com
Volume 4; Issue 5; September 2018; Page No. 29-34

Information technology and financial sector performance in Ghana: (An empirical analysis of selected financial intermediaries)

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Abstract
The application of Information Technology in financial service delivery on the market has become inevitable due to the numerous advantages the institution stands to gain as a result.
Most of the financial institution in Ghana have resolved to the use of more sophisticated IT innovations which comes with its own user cost to the institutions in its quest to improve quality of services provided, increase customer base and satisfaction, increase volumes of transaction and eventually improve firm's profitability on the market. The main objective of this study is to investigate the effect of IT innovations on the financial sector performance in Ghana.
The methodology adopted were both qualitative and quantitative methodology, where both descriptive and quantitative estimations were made to investigate variables involved in the study. SPSS 16.0 version was used to estimate the regression results for the specified model. The model was evaluated or analyzed with both p-values and the coefficients for the purpose of statistical inferences and determination of the significance of the explanatory variables in the model specified for the study.
The study finds a positive and significant relationship between application of IT innovations and financial sector performance in Ghana given the data gathered, that IT application in financial services helps to ensure effective evaluation of all business processes, and help to multi-task to meet varying client's expectations on the market; it is therefore recommended that this tool is always employed in monitoring and evaluation of all clients transactions, carefully scrutinizing the risk characteristics of clients so as to help reduce the default rate of clients and accumulation of bad debts, and eventually help to improve firm's profitability on the market and its ability to meet the social responsibility in their environment of operation.

Keywords: information technology, financial performance, empirical, regression

1. Introduction
There is one and only one social responsibility of business – to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud, according to Milton Friedman. Technology is now considered as the main tool for the organizational success and as their core competencies are defined by the knowledge and ability to use IT tool in business operations and information. The desire to reduce both operational and administrative costs and improve profit levels has driven most financial intermediaries to the electronic world, though cost reduction can also be achieved as a result of an increase in consumer adoption (Stewart, 2003, Yaklef, 2001, FinCen, 2000). Yasuharu (2003) and Daniel (1999), argued that financial institutions wish to move along with global changes as well as improve the quality of customer service delivery and their satisfaction through the careful application of IT and to achieve this at a reduced cost the intermediaries invest in the various IT innovations. They have also adopted complex networking programmes to enhance security and the delivery of high value products and services to the client on the market.

1.1 Statement of the Problem
The massive installation of modern information and communication tools in the financial institution is very conspicuous in almost every financial intermediary across the country, irrespective of the location and the size of operation on the market (Aliyu and Tasmin, 2012).
Alu, (2002) also supported that IT enables financial institutions to streamline their operations, increase their competitive advantage and also increase the variety and quality of the service provided. Notwithstanding this seemingly beneficial usage of the IT tools in banks, this innovations comes with a increased user cost of capital and inversely affect the firms profitability, this challenge is coupled with rising cybercrime in the financial institutions, high levels of incompetency to operate these IT tools and their application in the financial administration procedures, limited number of IT Systems administrators or IT professionals, under develop enabling factors (unstable electricity supply to power these complex systems, poor internet service to customers with online services) among others and so it appears these and other challenges such as unfriendly customer service processes do not motivate clients of these financial organizations to patronize the electronic service delivery channels in Ghana; resulting into the underutilization of the installed capacity of these ICT systems with the firms, (Bannie, 2001).
Donkor (2008) conducted a study and observed that banks

have invested deeply into these electronic systems and telecommunication devices, customers, on the other hand, have been made to understand the benefits of using these systems; however these systems are underutilized. Even though ICT products have brought about transformational changes in financial intermediation, there are some serious challenges posed by these innovations in the industry.

Awulatu (2012) Adoption of information Technology (IT) by organisations provides many benefits including increased clientele base and the real market share of the firm, more revenue, higher quality customer services and arguably increased profitability among others. As a result, the study sets out to do an empirical study on IT innovations and financial sector performance in Ghana, using a case study of some selected intermediaries.

1.2 Objectives of the Study

The main objective of this study is to investigate the effect of IT innovations on the financial sector performance in Ghana.

Specifically, the study intends to:

1. Examine how IT application in the intermediaries have helped to ensure efficiency, reducing transaction cost and improve profitability of the financial institutions.
2. Evaluate the forms of electronic products products available and patronized by clients,
3. as well as the level of satisfaction of customers consuming these IT innovations from the firms.
4. Investigate the challenges facing IT application in the financial intermediation processes of the institutions on the market.

1.3 Research Questions

The research questions which will be addressed in the study include the following;

1. How IT application in the firm does has helped to ensure efficiency, reduce transaction cost and improve profit profitability of the financial institutions?
2. What are the various forms of electronic product or IT innovations mostly patronized by clients and how do these affect customer care and level of satisfaction?
3. What are the challenges facing IT application in the financial intermediation procedures of the firm on the market?

1.4 Hypotheses

1. **H_0:** There is no significant relation between IT innovations and financial performance.
2. **H_1:** There is a significant relation between IT innovations and financial performance.

1.5 Overview of Methodology

Questionnaires were sent to the selected financial institutions to collect primary data from respondents in the main office of these firms across the ten regions in Ghana.

Based on the nature of the research and data that was collected, qualitative and quantitative estimation techniques were used to help explore the set objectives for this study.

For descriptive estimates; the frequency distribution, percentages means were adopted while Ordinary Least Squares (OLS) regression Model was used because of the nature of the data and also the study interested in estimating the marginal effect of explanatory variable use to estimate to help investigate the statistical properties of the variables, using the SPSS 16.0 version. The Cronbach Alpha was used to determine the validity and reliability of the question items set for the study.

1.6 The Scope of the Study

This study covered the following aspects of the financial system in Ghana. The efficiency matters, profitability, and cost of transaction issues of the firms and IT procedures mostly patronized by clients and satisfaction of clients of the firms.

The challenges mostly faced by introducing IT innovations in the firms and lastly the customer default rate, loan recovery matters, among others.

2. Empirical Literature

The major success of IT is because of its convenience, easy access, and safety, (Vasantha *et al*, 2014). According to a study conducted by Aboagye (2010), an important security issue with the use of credit card is credit card fraud. When the credit card is stolen or the PIN was stolen, users suffer unauthorized charges. For early detection, users must frequently check their card statement in order to be sure of all transactions. Credit card fraud may also occur when an account is open in the user's name without his/her authorization. This occurs when a hacker manages to steal from the user's mailbox a pre-approved credit card offer

Milion Assefa Tafa in (2013) conducted a study on the impacts of electronic banking on customer satisfaction in Ethiopian banking industry (the case of dashen and wogagen banks in Gondar city). The study used tables, percentages, chi-square independency test to see the relationship between demographic characteristics and e-banking, independency t-test to see the visits of branches before and after e-banking by customers is significant or not and regression analysis test was conducted to explain the variables which determine customers' satisfaction in e-banking. The results of the study implied that majority of users of e-banking were the young, the educated, salaried and students, business men and women were not actively using the service of e-banking and there is also a relationship between e-banking and demographic characteristics, e-banking currently provided for saving and current accounts holders only, and that e-banking has improved customer satisfaction.

Sameni Keivani *et al* from Islamic Azad University in Iran conducted a study on the general view on the e-banking, The aim of this research was to examine e-banking and propose strategies to harness e-commerce into traditional retail banking services. New electronic systems and especially the "Internet business development in the last century led to fundamental are changed how cultural exchanges, economic and social communities. The Internet has changed the dimensions of competition in the retail banking sector. In this paper is examining theoretical analysis on electronic money, electronic banking and its history, characteristics and ways to expand its e-banking culture.

Shumaila (2012), suggests that IT Banking adoption is a complex and multifaceted process and a joint consideration of

customers' personal, social, psychological, utilitarian and behavioural aspects is more important than adoption itself and will ultimately result in the intended behaviour.

Moghadam, Baytollah Akbari; Behboudi, Mehdi; Jafari, Farzaneh (2012), in their research say that customers are encouraged to utilize IT banking as first priority. Increasing the customer's arousal by IT advertisements to use IT banking creates a positive attitude toward bank's brand, which in turn is the key factors in IT banking effectiveness.

Jahangir, Nadim; Parvez, Noorjahan, (2012) research states that IT banking needs compatibility, convenience, and communication on customer adaptation. In the context of private commercial banks in order to attract more users to IT banking, it is not going to be enough only to introduce IT banking system, but they need to develop the belief of usefulness of the system among their users. The importance of IT banking needs and the ease of using it should be acknowledged by a demonstration on a trial basis.

3. Materials and Methods

The methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used to undertake the study. It is the systematic and theoretical analysis of the methods applied to a field of study which comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative technique adopted for a particular study or research; (Irny, S.I. and Rose, A.A. 2005). According to Yin (2003It also takes into account the research design, sampling techniques, sample size, and data instrumentation.

3.1 Research Design

The research design is said to be the structure of the research, that is, it is the center that holds all elements of the project. Again, under the design, the researcher talked about the qualitative and quantitative research approach adopted. Some of the Qualitative analyses that were adopted for the work were summary statistics for the variables use in the estimation and also through the use of bar chart and pie chart to investigate the effect of IT innovations on financial performance, with a case study of some selected financial institutions in the Ghana.

3.2 sample size or a statistical sample

It is the number of observations selected from the total population. The sample size is an important feature in any empirical study, in which the goal is to make deductions about a population for a particular study. Essentially, the sample size used in a study was based on the cost of data collection, and the need to have sufficient statistical or explanatory power from the estimation. The research study covered a sample size of about 200 top management's members from financial institutions and 500 customers making up to 550 total sample populations for the study.

3.3 Sources of Data

Primary and Secondary sources of data were used for the study. The individual customers, business entities and the staff of the banking and insurance institutions were provided with questionnaires for the primary sources of information, whiles the Secondary sources of data include recent publications on IT innovations in financial institutions on the internet, website, students' unpublished thesis and handbooks on IT innovations.

3.4 Data Collection Approach and Instruments

The data collection approach used was the survey method. This is because; surveys represent the most commonly used the instrument in data collection in the social sciences.

In general, surveys are methods of data collection in which information is gathered through questioning. Face to face interview and questionnaire administration were used in collecting the data.

3.5 Questionnaire

Questionnaires are prepared a set of questions use to obtain information from a respondent. Experience has shown that effectiveness of questionnaire can generally be improved by following some well conventional guidelines. This relates to layout, length and question order. In the survey, the Likert-scale technique was used in the formulation of the questionnaires.

The questionnaires designed for this study basically contained closed-ended questions with options for responses provided for the respondents to choose from. Structured questionnaires were used to elicit relevant information from the respondents.

4. Data Analysis

SPSS 16.0 version was used to estimate the regression results for the specified model. The model was evaluated or analyzed with both p-values and the coefficients for the purpose of statistical significant of the explanatory variables in the model specified, and various diagnostic test constructed to help avoid misspecification and multicollinearity problems in the model

4.1 The General Model

$$\gamma i = \sum_{k=i}^{n} \beta i V i \ldots\ldots\ldots\ldots (1)$$

Where

Vi is a Vector representing all variables influencing financial sector performance in Ghana.

4.2 Stochastic Representation of the Regression Model

$$f(\Upsilon i) = a_0 + \sum_{n=1}^{\vartheta} (\beta 1\,X + \beta 2X + \beta 3X + \beta 4X + \beta 5X + \beta 6X + \beta 7X + \beta 8X + \beta 9X) + \mu \ldots\ldots (2)$$

The dependent variable (ϒ), of the model, represents the financial service performance

The explanatory variables take into account the various electronic services provided by financial institutions, these include Automated Teller Machine, Telephone Banking, Interbank fund transfer, SMS Alerts, Credit and Debit Cards, Branch Networking, Transfer Email Alerts, Internet

transactions, and Periodic transaction Statement). Where ***f*** is the functional form of the model, showing the relationship between financial performance, *(ϒ)* and regressors influencing this variable (Anna Koutsoyiannis, 1977, and Guajarati Damodar, 2003).

All Variables in the model are Ordinal Variables, on the Likert-Scale, where respondents were required to make a choice on a scale of 1-5, where 1 is the most preferred choice and 5 the least preferred item on the scale.

4.3 The Exogenous Explanatory Variables

X_1=Automated Teller Machine Services, X_2= Telephone Services,X_3= Interbank Fund Transfer, X_4= SMS Alert/ Product, X_5= Credit and Debit Cards, X_6= Branch Networking Activities, X_7= Transfer Email Alerts, X_8= Internet services/ Products, X_9= Periodic Transaction Statements, μ=Error-term, representing all other variables influencing financial sector performance, but where not included in this estimated model.

A Priori Expectation of Coefficients Estimated

The expected signs of all coefficients in the model (i.e. β_1,β_2, β_3,β_4, β_5, β_6 β_7 & β_8 β9), Were positive, implying that when the availability of these IT innovations increase, financial sector performance will increase, all things being equal.

4.4 Results and Discussion

Table 1: Empirical Estimation Results from Regression Model

Variables	Coefficients	Std Errors	T-Stat	P-Values
ATM Services	0.441***	0.201	2.194	0.000
Telephone Services	0.312*	0.201	1.55	0.050
Interbank Fund Transfer	2.01***	1.002	2.005	0.000
SMS Alert/ Product	0.252***	0.114	2.210	0.000
Credit and Debit Cards	0.137*	0.120	1.141	0.128
Branch Networking	0.153**	0.021	7.285	0.003
Transfer Email Alerts	0.202*	0.052	4.042	0.000
Internet Service/ Product	0.020	0.205	0.097	0.430
Periodic Transaction Statements	0.032	0.063	0.5079	0.880

***Source*:** Researcher's Survey Data (2018)
Legend: * p<0.01; ** p<0.05; *** p<0.001

Goodness of fit/Regression line

$$\Upsilon = 3.0 + 0.4X_1 + 0.3X_2 + 2.0X_3 + 0.3X_4 + 0.1X_5 + 0.20X_6 + 0.02X_7 + 0.03X_8 + \varepsilon \quad \ldots\ldots\ldots (3)$$

4.5 Interpretation of the Regression Results (Coefficients)

The table above presented the regression results as estimated in the OLS model. Specified.

The dependent variable (**ϒ**) of the model is the variable representing *Financial Performance, and this depe*nds on the regressors (ATM Services, Telephone Services, Internet Services, SMS Alert, Credit and Debit Cards Usage, Branch Networking, Transfer Email Alert, Interbank Transfer and Periodic Transaction Statement)

Most of the expected signs of the regression coefficients (that is, the marginal impact of the explanatory variables on the dependent variable- Financial Performance), were met in the regression model estimated for this study.

The coefficient of β_1, (0.441***), was expected to be positive and this expectation was met, implying that when the ATM services variable increases by one unit, that is, there is an increase in the patronage of the institutions ATM systems, the firm's performance will increase (Basically, in terms of profitability) by 0.493 units; revealing a positive relationship between ATM services patronage and the performance of the firms, this increases the net transaction volumes of business, all thing being equal. This was statistically significant at 0.05 error level, given the P-value of 0.000, which is less than 0.05. This implies that any policy decision based on this variable's outcome is appropriate and recommended.

The coefficient of β_2, (0.312*) was expected to be positive and this expectation was also met, implying that when the patronage of Telephone services increases by one unit, financial performance will increase by 0.312 unit, also showing a positive relationship between Telephone banking product and financial performance, which is mostly experienced between corporate organizations and financial institutions on the financial market this variable was equally very statistically significant at 0.05 error level, given the P-value of 0.05. This implies that any policy decision based on the variable will help improve the financial sector in the economy.

From the model estimated, the coefficient of β_3, (2.01***), was expected to also be positive and this expectation was equally met, implying that when Interbank money transfers variable increases by one unit, financial performance will increase by 2.01 units; and this was very statistically significant at 0.05 error level, given the P-value of 0.000, which is less than 0.05. again, implying that any policy decision based on this variable will not yield any misleading results in the financial sector of the economy.

Again, from the model estimated, the coefficient of β_4, (0.252***) was expected to be positive and this expectation was again met, implying that when SMS variable increases, this increases financial performance with the intermediaries, and, this variable was also statistically significant at 0.05 error level, given the P-value of 0.001, which is less than 0.05. This implies that any policy decision based on the variable will help improve the financial sector in Ghana.

From the model estimated, the coefficient of β_5, (0.137), was expected to be positive and this expectation however, this variable was not statistically significant at 0.05 error level,

given the P-value of 0.403, which is greater than 0.05. from the data gathered.

From the model estimated, the coefficient of the coefficient of β_6, (0.202*), was expected to be positive and this expectation was met, implying that when there is branch networking of the financial activities of the intermediaries, this leads to an increase in the performance of the firm; and this was very statistically significant at 0.05 error level, given the P-value of 0.001, which is less than 0.05. again, implying that any policy decision based on this variable will not yield any misleading results on the financial market.

From the model estimated, the coefficient of the coefficient of β_7, (0.020), was expected to be positive and this expectation was also met, implying that a unit increase in the transfer email alert variable will increase performance by 0.020 unit; and this was not statistically significant at 0.05 error level.

The coefficient of the coefficient of β_8 (0.032), again, was not significant, implying that any policy decision based on this variable may yield a misleading result in the financial sector.

Other Indicators

The "*R"* indicates the multiple correlation coefficients, the value of 0.75 from the model summary, indicates a strong positive correlation between the financial performance and the exogenous variables. And this confirms the positive and significant relations between the coefficients and the endogenous variables in the model specified.

The R-Square (R^2), from the model summary, indicates the coefficient of determination; the absolute value of 0.652, indicates that about 65% of the variations in the dependent variable financial performance, was explained by the exogenous variables used in the estimation.

The *F-Statistic* from the ANOVA table indicates the overall significance level of the model estimated, given the F-Stat = 63.585, and the P-Value of 0.001. It can be concluded that the estimated model was statistically significant, according to the data gathered for the study.

4.6 Reliability Test

The reliability test was run to help determine the reliability and internal consistency or the average correlation of variables within the test items used to elicit information for the study, (George and Mallery, 2003); the Cronbach Alpha indicator for this test was 0.91.

From the above indicator value it could be observed that the items used to elicit information for this study were highly reliable and ensures solid internal consistency within items, given the Cronbach Alpha Value of 0.91.

5. Summary of Major Findings

1. The descriptive analysis done from the data gathered for the study revealed that majority of the respondents sampled where senior management staff, constituting about 67.4%, while the rest 32.6% were customers. With very significant years of experience with the institutions; ranging between 11years to 20years.
2. From the data gathered, those intermediaries using IT for service provision were about 74% percent, while only 26% were not using IT in their operations.
3. According to the data analyzed, about 60.4% agreed that IT application in financial services always helps customers to have easy access to their account and the needed financial information for the transaction, while 39.6% said it always convenient and saves time during the business transaction.
4. Again, the study revealed that IT application will always ensure effective evaluation processes of clients transactions, and do grant the flexibility to deal with different customers at the same time during transactions; this was made up of 78.2% and 21.8% of total respondents respectively.
5. From the study conducted, it also came up that IT application grants the ability to multi-task to meet customer need and increase customer confidence and ensures privacy in all transactions.
6. These findings above confirm Saranya, Anitha and Vasantha, (2014), who came up with similar finding of easy access to bank accounts, ensuring convenient banking activities. Again, Milion Assefa Tafa in 2013 established a significant relationship between electronic banking activities and demographic characteristics of respondents in their empirical study on Banks in Bangladesh.

5.1 Conclusion

This study set out to explore the effect of IT innovations on financial sector performance in Ghana, with a case study of selected financial institutions in Ghana. The study can conclude that there is a statistically significant relationship between IT innovation variables (Automated Teller Machine, Telephone Services, and interbank fund transfer, SMS Alert Services, Branch Networking, and Transfer Email Alerts) and financial performance. However, Credit and Debit Cards, Internet Banking and Periodic Transaction Statement generation were found not to be statistically significant, according to the data gathered for this study.

5.2 Policy Recommendation

1. The study recommends that financial intermediaries using IT in services delivery should tailor their services with improved security features; this will ensure privacy and boost the confidence level of their customers to patronize these products on the financial market, particularly, the near money and money substitutes electronic cards and online financial transaction. This has the potential of increasing volumes of transaction and firms profitability.
2. Financial intermediaries must always ensure that IT application to services to delivery are very efficient to reduce the user cost firm's capital and customer turnaround time to transact, this will create customers satisfaction and have the potential to increase market share of these intermediaries on the financial market.
3. The study revealed that IT application in financial services helps to ensure effective evaluation of all business processes, and help to multi-task to meet varying client's needs; it is therefore recommended that this tool is always employed in monitoring and evaluation of all transactions, carefully scrutinizing the risk characteristics of clients so as to help reduce the default rate and accumulation of bad debts, as this can put the firm in an uncompetitive financial position and eventually collapse the firms, as experienced

in the Ghana's financial sector, Bank of Ghana withdrew the licenses of five commercial banks and collapsed them into one as Consolidated Bank, for insolvency of these institutions; diligent application of IT would help avoid such weak financial practices.

5.3 Limitations of the Study

The Ordinary Least Squares Methodology is said to be a weak econometrics technique to explore the linear interdependency of variables in a specified models, however, Gauss-Markov theory still accommodates OLS estimations, as it is still BLUE. Again, the DOLS or the probability models methodology such as Tobit, Multinomial Logistic, Probit regression estimation, which are mostly employed for primary data estimations could be used in this study.

5.4 Suggestion for Further Research

The study suggests that further survey should be conducted into how demographic characteristics of customers influences their decision to patronize ICT services with banks in Ghana using more dynamic models such as Dynamic Ordinary Least Squares (DOLS,), Vector Auto regression (VAR), Models estimations, or the Probability models estimations; this will help to explore a more realistic dynamics in variables of such nature.

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