Selection and ranking of perceived risk associated with mobile banking in West Africa: An AHP Approach from customers' perspective.

Komlan Gbongli, Yi Peng, Owusu Ackah

Abstract—Mobile Banking acceptance and usage has grown in recent times in most economies; however the risk and loss of privacy in the security system are part of the main issue discussed so far. Furthermore, in the high risk nation where there is the need to use mobile phone for banking transaction, the use of M-Banking and the benefit derives from it may be quiet perceived differently. Previous research that analyzed adoption of M-banking focused on specific area or particular point of analysis not really the current situation of the countries and the service providers. Many countries in West Africa are facing war and vulnerability by terrorism attack. Thus, how the risk related to the adoption of M-Banking might be perceived and evaluated needs to be examined.

The major point of this study is to identify and prioritize the key perceived risk factors from consumer's point of view. Allowing to rate these factors as critical aspect that can improve customers' adoption of M-Banking and help the banks to provide more favorable and reliable operation system service for their customers. We use AHP (Analytical Hierarchy Process) based on MCDM (Multi-Criteria Decision Making) to evaluate and rank the different factors that contribute to impact the adoption of M-Banking in the view of Perceived risk. The findings suggest that regardless of the impending danger, the mobile banking users who were assessed, perceived the benefit resulting from use as being important and care more about their financial risk situation especially with financial loss as alternative than others. Certainly, West African Countries educated citizens accept new technologies such as mobile banking and try to cope with today's development in technologies following the developed countries.

Index Terms— Analytical Hierarchy Process (AHP), Mobile Banking, Perceived Risk, West Africa, Customers

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1 INTRODUCTION

The information Technology(IT) over many years have been deeply empowered by Financial Institution Worldwide, starting from the use of wireless internet to access of a variety of banking innovative services in order to improve customer and services relationship. The internet has developed from its fixed line constraints and is increasingly mobile, putting Mobile Banking in a higher market position. The internet is now available to mobile users, with all its versatile user application interfaces. Although, ATM, Telephone and Internet Banking present successful way as compared to traditional banking product, M- banking sector is the nearest canal put in place by retail and microfinance banks in developed and developing countries and predicted to have effect on the market [1]. Though such benefits are offered, the use of mobile as channel for the banking transaction is still under early stage [2.] Mobile technologies and services are predicted to be the possible motivating force that will bring diversification opportunities for businesses. Mobile technologies characteristics have allow mobile phone users to enjoy applications that had previously been conserved for the personal laptop users. Accordingly, researchers have reinvented the concept of Electronic-Commerce to include the

capacity of mobile phones which is almost at the same level of personal computers, [3] [4]and later showed some countries making good progress in using Mobile Banking and even integrating it in their basic activities, like China, Japan, South Korea, however Europe, North America and Asia-Pacific as well as Australia and New Zealand proved otherwise. Forrester reports showed that, along with 2.5 million Bank of America's online users, only 4 per cent are active users of M-banking [5]. A study of German customers showed that only 12 per cent would consider using mobile phones for banking or shopping [6]. These reports confirmed indeed, these countries are still behind the trend of the usage of M-Banking, and are not so far from Middle East Asia and Africa countries including Saudi Arabia, South Africa and West Africa.

The rate of the Adoptions are utmost in so-called developing countries, reaching 60- 70% in China and India in comparison to developed one, such as the US, Canada and the UK [7].Considering the rate of Adoption in Africa within the different part of Africa, Sub-Saharan Africa (SSA) has emerged by discovery their way to use the third generations (2G and 3G) mobile phones to solve the pecuniary activities. In Kenya and East Africa, Vodafone brought a great success by managing the M-PESA mobile money [8] [9] [10] [11]. Although M-PESA has brought financial inclusion to millions of Unbanked in Kenya, West African countries like Togo, Mali, Ghana, Nigeria are still behind the tendency with less than 10 percent rate of adoption and the recent finding confirmed that mobile banking adoption in Ghana is low as compared to developed nation of the world in spite of the high level of

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consumer knowledge in the country [12] at the same moment, I.T. providers and financial institution anticipate that m-payment will reach deep mass in the subsequently few years [13]. Yet, there is a certainty that Customer perception about the adoption of M-banking comes to play an important factor as to the barrier of the development of M-banking.

Risk Perceived and Trust is interconnected facet which has been mostly proved to be the main factors of the online service mainly in the banking sectors [14], [15], [16]. Furthermore, previous study on mobile networking has identified the necessity of increasing attention in the direction of cultural differences and perceptions of mobile services [17] and suggested that, mobile phone users in the Western World may have a different judgment about the security, and risk issue compared to those in more dynamic changing countries and contexts. Our study leans to emphasize on the perceived risk from the end- users in the unstable countries as West Africa. Firstly, it will give reason to the logic on mobile users who accept as true their cellular service provider exposed their privacy and personal information to a higher risk. There is every reason to consider that the vulnerabilities to a user may lie within the network. Generally, during a connection to the network, mobile users stroll throughout various units or function, which predisposed them to malevolent or compromised cell domains with the potential of engaging in information theft or identity theft and denial of service, among other threats [18].

Thus, we made an evaluation based on Analytic Hierarchical Process (AHP) to extract the major Perceived Risk Factors entering into the Mobile banking sector that dealing with the instable situation of the West Africa Countries and prioritize them through a quantitative method.

Chapter 2, will be the review of related works, pull out the overall perceived risk factors of M-Banking and alternatives, and scrutinize the main feature and components of AHP. Chapter 3 will apply AHP techniques calculation to evaluate the key factors involve in the risk perceived by the M-Banking customers, find the criteria for the alternative selection, and selection factors. Chapter 4, prioritized the extracted factors and alternatives and Chapter 5 Discussion and draws the Conclusion

2 RELATED WORKS

The embracing rate of the cellular phone adoption is supposed to grow fast in developing countries [19]. Nevertheless in less prosperous nations suffering from political instability, terrorism and war, mobile technologies may have distinct point of view to their users. Both conflicting pressures due to those countries who are ready to supply customers with the mobile access and the external forces like terrorist groups, who intend to reduce or control information access, or even the identity theft, lead to the sinking first choices to Embrace the mobile device from the citizen mobile users[20]. Since the technology adopters have been aware about the perceived risk effect, there is a need to address these issues in the way that the profit the customer using the technology will gain from it

must be large enough to alleviate the risk taking. Understanding this, customers who reveal private information to companies run the risk that his information will not be used in a suitable way, so businesses are frequently required to notify customers of their advice use practices [21]. Therefore, it must be anticipated that the mobile service provider's expectation will influence the level of risk perceived by mobile devices users. Although, many different kinds of risk and some of which are more relevant in an unstable or developing nation than many others. Financial, information Privacy, performance risk are the prevalent risks found in Mobile Commerce through E-commerce research [22] and culnam et al (1999) [23] defined performance risk as the probability that the product bought on line, or the program running by the bank will fail or not work as desired.

Financial risks involve the risk of value where customer may overpay for an underperforming item. Mobile technology use can result in financial risk for those individuals in developing nations who needs stable or enough income to afford their basic needs. Furthermore, in hostile regions, objective risk associated with technology use or information collected through technology use are predominant according to Cox [24] et al.., the consumer need to take a big decision and face the consequence related to it.

Overall, embracing cellular devices with these risk required different level of risk hypothesis, and that different from those e-Commerce theory has emphasized on. There are many study conducted on M-Banking adoption but very few study centered on decision making by customer for selecting the risk they perceived. Though sometimes, customer may be conscious about the risk associated with the M-Banking, and clearly alert that they will face some risk, but how to evaluate and prioritize them, will help both the providers and the users to decrease the risk taking level. The theoretical background of this research is resulting from the literature areas of e-commerce and add-value. Specifically, this research is focused on the m-banking sector as in existence literature on the adoption of e-technology focuses on the selection and ranking overall risk factors influencing Customer acceptance M-Banking which risk component may be clarified [25].

2.1 Relevant Research Field on Perceived Risk in Mobile Banking

The concept of Perceived Risk was first brought forward by Harvard scholar Bauer in the year 1960 where he defined "perceived risk" from psychological part of the study of consumer behavior. Bauer stipulated that all consumer behavior may come from unsure outcome which cannot be predicted by consumers themselves, and some of the effect could be unpleasant, thus consumer behavior involves risk from this common sense [26]. This risk was related to subjective risk (i.e. perceived risk), which is different from the real risk according Bauer. Behind any business company, the direct risk that the consumers is exposed concerning the product, play an important role in the decision making process. Embrace or reluctant to the product or service of the company, mainly when the consumer perceive a certain

degree of doubt about it, is known as perceived risk. The following 40 years after the research of Bauer, many researchers have moved to perceived risk dimension, to contribute to the research field. Earlier work of Cox (1967) [24] suggested that the first identification of perceived risk may include financial and social psychological components of two kinds of risk. Based on this, Jacoby and Kaplan (1972) [25] on the perceived risk components with comprehensively research thought that more complete works should include: time of risk, functional risk, physical risk, financial risk, social risk and psychological risk. Jacoby and Kaplan selected 148 students as study objects, evaluated perceived risk of 12 different consumer goods, which result explained 61.5% of the variances of the overall risk. The research on the dimensions of perceived risk is the basis of research on perceived risk.

Perceived Risk is the risk discovered on the service itself [21] which is identified as the consumers' expectation of suffering a loss in the result of using Mobile Banking [27].

The psychological aspect of perceived risk should be highly consistent with further aspect, while all risks are perceived by individuals. Additionally, [21] [27] Featherman et al(2002), Pavlou et al (2001), foresee consumer acceptance level of electronic services from the perceived risk view and pointed out that social risk, privacy risk, economic risk, functional risk, psychological risk, and time risk are the six dimensions that exist in the internet consumer adoption.

Supported from the above definition and the previous literature, we can draw the criteria which may be seen to be more important in the perceived risk perspective in the field of M-Banking.

TABLE1: CRITERIA FOR PERCEIVED RISK	
Performance Risk	The probability that the product or M-Banking function may not perform well as it was designated and advertised, as a result, failing to deliver the expected benefits
Financial Risk	It is identified as the potential for monetary loss due to transaction error or bank account misuse
Time Risk	It is related to the loss of the time incurs due to the delays of receiving the payment or the complexity of navigation.
Privacy Risk	This is defined as a possible loss due to a hacker or fraud compromising the security of a M-Banking user; potential loss of control over personal information.

2.2 Risk Avoidance or Risk Tolerance
The perception of risk avoidance should be guided by both the legal and technological aspect. Beginning with the single technical procedure will not preserve business customer to be vulnerable to the perceived risk in question. Then, it is so complex for any advanced technology to play a role in the technical measures, management, integration mechanisms and legal means to fully protect the security of mobile commerce transactions or M-Banking [28]. Alice et al established the relation between the risk averse and risk tolerance, that consumer with higher levels of risk tolerance is more likely to accept mobile banking, even after scheming for their

perceptions of the riskiness of the mobile banking. Contrary to that, those who think that M-Banking is not safe, or really do not know how secure it is, accept it at the low rate.

Therefore, to identify a consumer's readiness to cope with risk, or the consumer's level of risk aversion variable is tough. This research was to build off the earlier literature of technology adoption and consumer selection and ranking models by disaggregating consumer's expectation into their psychological risk of the technology particularly into the overall level of the Mobile Banking risk.

2.3 Overview of AHP Process
As mentioned from the above, Analytical Hierarchy Process (AHP) has been used to identify and prioritize overall risk perceived. AHP as decision making method developed by L. Saaty in the year 1970, which uses Multi-Criteria Decision-Making techniques (MCDM) is a technique for solving problems with complex multiple criteria called hierarchical analysis method [29]. Hierarchical analysis sub-divides a complex decision making problem into easily understandable hierarchy elements and makes decisions based on the elements and transforms qualitative factors into quantitative variable. The method is based on the pair-wise comparison and the decision makers begin the operation by creating the decision tree. AHP satisfies theorems such as reciprocal, homogeneity, dependency and expectation, which allows alternatives to be extracted through different steps. It has two characteristics: One is to divide the issue into category based on the property of the issue and the final objectives, second is to construct a hierarchical structure model by which the causalities among the factors, sub-factors and alternatives are made [30].
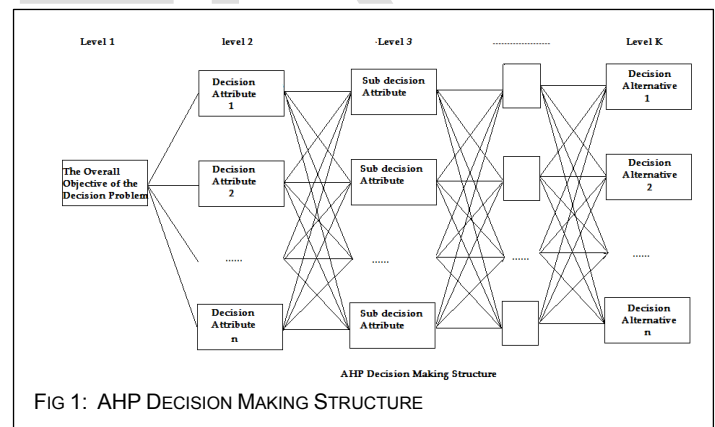

FIG 1: AHP DECISION MAKING STRUCTURE

Structure of Decision Making Tree of the AHP Process
• State the problem.
• Broaden the objectives of the problem or consider all actors, objectives and its outcome.
• Structure the problem into hierarchy.
• Comparing and obtaining the judgment
• Calculation of Local weights and consistency of comparison and Normalize value for each Criteria/alternative
• Aggregation of weights across various levels to obtain the final weights of alternatives

Table 3: Questionnaire templates for pairwise comparison of three factors

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
2	Weak or Slight	
3	Moderate Importance	Experience and judgement slightly favor one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favor one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	One activity is favored very strongly over another, its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation

The value in between 2,4,6,8 is intermediate values that can be used to represent shades of assessment between those five basic judgments. In this case for instance, A is very strong important (7) than B as a criterion for the decision, then the riverside index value 1/7(0.14) is assigned to B. In some situation, it has been assumed that the decision maker has to be consistence in making assessment concerning any pair of criteria since all criteria will always rank equally when compared to themselves, it is only ever necessary to make $1/2(n)(n-1)$ comparisons to establish the full set of pairwise judgments for n criteria: Then the results of all pairwise comparisons is stored in n x n input matrix A = [aij]. Where aij is the intensity of importance of criterion ni compared to criterion nj

Table3: Questionnaire templates for pairwise comparison of three factors

Factor	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
A (Row1)								×									
A (Row2)							×										
B (Row3)													×				

Criteria for pairwise comparison

$$\begin{array}{c} \quad A \quad B \quad C \\ \begin{array}{c} A \\ B \\ C \end{array} \begin{bmatrix} 1 & 2 & 3 \\ 1/2 & 1 & 1/5 \\ 1/3 & 5 & 1 \end{bmatrix} \end{array} \qquad (1)$$

Table 4: Random Index

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Consistency

The consistency' major steps of the judgment matrices:
The computation of the consistency index CI
$CI = (\lambda \max - n)/(n-1)$ is compared with the average RI obtained from associated random matrices of order n to measure the error due to inconsistency [31]

Computation of the consistency ratio $CR = CI/RI$

A consistency ratio (CR=CI/RI) value of 10% or less is considered as acceptable, otherwise the pair-wise comparisons should be revised. After calculation is made in the way presented above, the relative weights of decision-making are summed to prioritize alternatives to be evaluated. The general importance is expressed as C $[1,k]=\prod_{i=1}^{n} Bi \bullet$ C[1,k] means the general weight of kth hierarchy element in the 1st hierarchy , and Bi means ni-1 ●ni matrix that contains the row forming the estimated w vector.

3 APPLICATION OF THE AHP TECHNIQUE IN THE CHOICE OF PERCEIVE RISK

Customer's choice criteria for Perceive Risk are based on the existing literature [32] [33] [34] [14] [35]. Figure 1 shows the structuring of the hierarchy of customers' choice issues, which includes tree levels. The top level of the hierarchy characterizes the ultimate goal of the problem, while the second level of the hierarchy consists of four major selection criteria, i.e. Performance Risk, Financial risk, Time Risk, Privacy Risk. Finally, these criteria are decomposed into various sub-criteria, which are called alternatives that may affect the consumer's choice for a particular decision in relation to the acceptance of M-Banking acceptance

3.1 Data Collection

The questionnaires were filled by highly-educated respondents with some managerial experiences and were asked to answer to a series of redundant pairwise comparisons. The research was carried out in Sichuan Province in China and some questionnaires were sent to people online even in their respective countries. We selected mostly the new comers University students from the West African Countries (Nigeria, Togo, Ghana, Ivory Coast and Burkina-Faso) as we believe they can have the real idea from back home. On the basis of the saaty's questionnaire layout, the interviewees measure the degree of preferences to which each criteria correspond to the sub-factors.

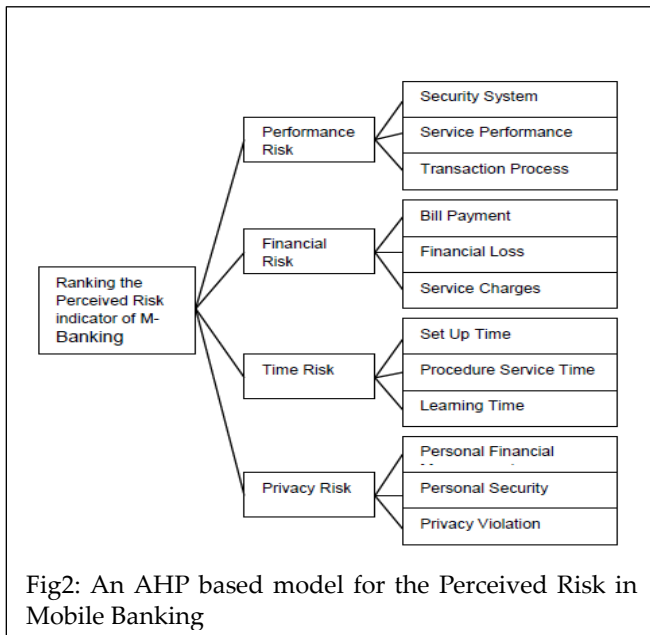## 4 PRIORITIZED THE EXTRACTED FACTORS AND ALTERNATIVES

Fig2: An AHP based model for the Perceived Risk in Mobile Banking

TABLE 5: THE RESULTING WEIGHTS ARE BASED ON THE PRINCIPAL EIGENVECTOR OF THE DECISION MATRIX

Criteria	Performance Risk	Financial Risk	Time Risk	Privacy Risk	Priority	Rank
Performance Risk	1	0.20	1.00	0.50	10.5%	3
Financial Risk	5.00	1	7.00	3.00	59.8%	1
Time Risk	1.00	0.14	1	0.50	9.7%	4
Privacy Risk	2.00	0.33	2.00	1	20.0%	2

Number of Comparisons=6   Consistency Ratio CR=0.4%
Principal eigenvalue=4.011   Eigenvector solution : 3 iterations, delta =4.5E-10

TABLE 6: RANKING THE INDICATOR IN RELATION TO PERFORMANCE RISK

SS: Security System
SP: Service Performance
TP: Transaction Process

	SS	SP	TP	Priority
SS	1	7.00	5.00	74.7%
SP	0.14	1	1.00	11.9%
TP	0.20	1.00	1	13.4%

TABLE 7: RANKING THE INDICATOR IN RELATION TO FINANCIAL RISK

BP: Bill Payment
FL: Financial Loss
SC: Service Charges

	BP	FL	SC	Priority
BP	1	0.20	2.00	16.7%
FL	5.00	1	7.00	74.0%
SC	0.50	0.14	1	9.4%

TABLE 8: RANKING THE INDICATOR IN RELATION TO TIME RISK

SUT: Set Up Time
PST: Procedure Service Time
LT: Learning Time

	SUT	PST	LT	Priority
SUT	1	3.00	2.00	55.0%
PST	0.33	1	1.00	21.0%
LT	0.50	1.00	1	24.0%

TABLE 9: RANKING THE INDICATOR IN RELATION TO PRIVACY RISK

PFM: Personal Financial Mgt.
PS: Personal Security
PV: Privacy Violation

	PFM	PS	PV	Priority
PFM	1	0.25	2.00	17.7%
PS	4.00	1	9.00	73.7%
PV	0.50	0.11	1	8.5%

TABLE 10: RANKING THE OVERALL INDICATORS IN RELATION TO MOBILE BANKING

	Indicators	Individual Weight	Overall Weight	Rank
Performance Risk (0.105)	Security System	0.747	0.078	4
	Service Performance	0.119	0.012	12
	Transaction Process	0.134	0.014	11
Financial Risk (0.598)	Bill Payment	0.167	0.099	3
	Financial Loss	0.740	0.443	1
	Service Charges	0.094	0.056	5
Time Risk (0.097)	Set Up Time	0.550	0.053	6
	Procedure Service Time	0.210	0.020	9
	Learning Time	0.240	0.023	8
Privacy Risk (0.200)	Personal Financial Mgt.	0.177	0.035	7
	Personal Security	0.737	0.147	2
	Private Violation	0.085	0.017	10

5 DISCUSSIONS AND CONCLUSION

This present research elucidates the customer choice towards the M-banking perceived Risk in the unstable developing country special in West Africa.

Undeniably, M-Banking implementation and use varies across contexts and cultures. Thus customers in developing nation or less developed countries may understand its usage quiet differently as compared to the developed countries. Previous researches model were more concentrated in the western countries and have not been tested through in those nations facing the political conflict, terrorism, or war and those situations we refer to as high-risk. The respondent mentioned from the interview that, those who managing the network may bring high distrust in the service they provide and also perceived high personal risks stemming from mobile banking usages, indicating they recognize potential vulnerabilities.

The actual choice criterion of the undergoing research which consists of the Performance Risk, Financial risk, Time Risk and Privacy Risk cannot be quantitatively and accurately measured. To manage and evaluate the decision maker's subjective in the view of Perceive Risk related to the use of M-Banking, we apply AHP which helps to provide accurate and consistent direct preference. Based on the selected elements, evaluation was made not for a particular Mobile Banking company in a narrow sense but for banking operating with mobile to help customer in the day to day financials activities in a large sense. The finding of the evaluation illustrates what elements mobile banking business managers should pay more consideration to. The mainly key indicator criteria (fig10) is Financial Risk(0.598) which embedded financial loss(0.443)as the most alternative factor that should be careful in way to avoid. Then after Financial Risk, follows by Privacy Risk, Performance Risk and Time Risk. Apart from the most important alternative which is financial loss in the Financial Risk Criteria, the next important alternative is Personal Security in the Privacy Security. Previous research which has been conducted in the field of Internet diffusion [36] across 143 large sample of the world's developing nations proposed that political conflict with adverse regime transitions, political violence, terrorism, and war would negatively impact internet use and eventually reduce societal economic growth. These forms of political conflict often negatively impact IT adoption and use through interfere with telecommunication infrastructure and by invoking fears of surveillance by either the government or opposition groups. On the other hand, our current research prove that the Privacy Violation (0.017) with the rank 10 which is one of the alternative standing for the criteria Privacy Risk is insignificant for the overall weight of the whole alternative. This information gives insight that the perceived need for access to communication, information exchange, and accessing the bank information through mobile devices apparently outweighs those vulnerabilities.

It is view that the West African Country's educated people acknowledge new technologies such as mobile banking and try to put into action themselves with today's development in technologies as same as developed countries. This research was able to confirm that, people care more about their financial risk situation than other. Meaning that, the instability socio-political situation of their countries is not affecting their decision to adopt the Mobile Banking Technology. Financial Institution operating M-Banking should implement a system with more guideline facilities, to increase the level of personal security protection of the customer and to have more adequate procedure when customer dealing with bill payment. In the light of the Performance risk, Security system of the banking software should be strong as to give confident to the users.

REFERENCES

[1] Safeena, R., Date, H., Kammani, A., Hundewale, N., 2012. Technology adoption and Indian consumers: study on mobile banking. Int. J. Comput. Theory Eng. 4 (6), 1020–1024

[2] Dineshwar, R., Steven, M., 2013. An investigation on mobile banking adoption and usage: a case study of Mauritius. In: Proceedings of the 3rd Asia-Pacific Business Research Conference, Kuala Lumpur, Malaysia.

[3] Lee, C.-P., Mattila, M., & Shim, J. P., "An Exploratory Study of Information Systems Resistance: The Case of Mobile Banking Systems in Korea and Finland." in Proceedings of Americas Conference on Information Systems (AMCIS), 2007

[4] Belkhamza, Z., & Wafa, S. A., "The Effect of Perceived Risk on the Intention to Use E- commerce: The Case of Algeria." Journal of Internet Banking and Commerce, vol. 14, no. 1,2009.

[5] Khan, M.A. (2008), "Consumers are apathetic about mobile banking", Forrester Research, available at: www.mobilemarketer.com/cms/news/research/1561.html (accessed 3 November 2009)

[6] Tanner, J.C. (2008), "Consumers still wary of m-commerce", Telecom Asia, Vol. 19 No. 7, p. 8

[7] David Hodgkinson, Vinkal Chadha et al Mobile Banking 2015 Produced in collaboration with and using primary survey data supplied by UBS Evidence Lab Global Trends and their Impact on Banks July 2015

[8] Holmes, G. (2011). Card and mobile payment opportunities: A framework to consider potential winners and losers and a snapshot of the future payments landscape in Africa. Journal of Payments Strategy and Systems, 5(2), 134-142.

[9] Bold, C., Porteous, D. and Rotman, S. (2012). Social cash transfers and financial inclusion: Evidence from four countries. Consultative Group for Assisting the Poor (CGAP), February, 1-20.

[10] Donovan,K. (2012). Private sector development: What's next for mobile money? The World Bank, http://blogs.worldbank.org/psd/what-s-next-for-mobile-money-0

[11] Ehrbeck, T., Pickens, M. and Tarazi, M. (2012). Financially Inclusive Ecosystems: The roles of government today. CGAP, February. 1-11

[12] Cudjoe, A.G., Anim, P.A. and Nyanyofio, J.G.N.T. (2015) Determinants of Mobile Banking Adoption in the Ghanaian Banking Industry: A Case of Access Bank Ghana Limited. Journal of Computer and Communications, 3, 1-19. http://dx.doi.org/10.4236/jcc.2015.32001

[13] Edgar, Dunn and Company and Mobile Payments World Magazine

(2008), "2008 mobile financial services study", available at: www.edgardunn.com/uploads/100023_english/100252.pdf (accessed 20 July 2009).

[14] Featherman, M.S. and Pavlou, P.A. (2003), "Predicting e-services adoption: a perceived risk facets perspective", International Journal of Human-Computer Studies, Vol. 59 No. 4, pp. 451-74.

[15] Gefen, D., Rao, V., & Tractinsky, N. (2003). Conceptualization of trust, risk and their relationship in electronic commerce: The need for clarifications. Proceedings of the 36th Hawaii International Conference on IS

[16] Lee, M., & Turban, E. (2001). A trust model for consumer internet shopping. International Journal of Electronic Commerce, 6(1), 75–91.

[17] Ngai EWT, Gunasekaran A. A review of mobile commerce research and applications. Dec is Support Syst 2007;43(1):3e15.

[18] Ghosh A, Swaminatha T. Software security and privacy risks in mobile e-commerce. Commun ACM 2001;44(2):51e7.

[19] Abu-Shanab, E, Abu-Baker A. Using and Buying mobile phones in jordan: implications for future research and the development of new methodology. Technol Soc 2014; 38:103-110.

[20] Lee J Rao HR. Perceived Risk, counter-beliefs and intentions to use anti-/counter-terrorism websites: an exploratory study of government-citizen online interactions in a turbulent environment. Decis Support Syst 2007;43: 143-149.

[21] S, M. Featherman, "Predicting e-services adoption: a perceived risk facets perspective". presented at 8th Americas Conference on Information Systems, Dallas, 9-11 August 2002

[22] Kim DJ, Ferrin D, Rao HR. A trust-based consumer decision-making model in electronic commerce: the role of trust, perceived risk, and their antecedents. Decis Support Syst 2008; 44(2):544e64.

[23] Culnan M, Armstrong P. Information privacy concerns, procedural fairness, and impersonal trust: an empirical investigation. Organ Sci 1999;10(1):104-115.

[24] Cox D.F., Rich S. Perceived Risk and Consumer Decision Making: The Case of Telephone Shopping[J]. Journal of Marketing Research, 1964,(11):32-39

[25] Jacoby J. and Kaplan L.B. The Components of Perceived Risk[J]. Proceedings, 3rd Annual Conference, Association for Consumer Research, 1972:382-393

[26] Bauer, "Consumer Behavior as Risk Taking," Proc AmerMarkAssoc, 1960, pp. 389-398.

[27] P.A. Pavlou, (2001) Integrating trust in electronic commerce with the technology acceptance model: model development and validation, in: Proceedings of the Seventh Americas Conference on Information Systems, 2001, pp. 816–822.

[28] Cope, Alice M. and Rock, Alexandra M. and Schmeiser, Maximilian D., Risk Perception, Risk Tolerance and Consumer Adoption of Mobile Banking Services (February 15, 2013). Available atSSRN:http://ssrn.com/abstract=2048565 or http://dx.doi.org/10.2139/ssrn.2048565

[29] Corner, J. L., Buchanan, J., and Henig, M. (2001). Dynamic decision problem structuring. Journal of Multi-Criteria Decision Analysis, 10, 129–141.

[30] Saaty, T.L. (2008) 'Decision making with the analytic hierarchy process', Int. J. Services Sciences, Vol. 1, No. 1, pp.83–98

[31] Saaty TL. Analytical hierarchy process planning, priority setting, resource allocation. NewYork: McGraw-Hill; 1980

[32] Walker, R.H., Craig-Lees, M., Hecker, R. and Francis, H. (2002), "Technology-enabled service delivery: an investigation of reasons affecting customer adoption and rejection", International Journal of Service Industry Management, Vol. 13 No. 1, pp. 91-106.

[33] Walker R.H and Lester W. Johnson, (2006) Why consumers use and do not use technology-enabled services, Journal of Services Marketing Volume 20 · Number 2 pp 125–135

[34] Lee M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit, Electronic Commerce Research and Applications vol 8 pp 130-141

[35] Grewal, D., Gotlieb, J., Marmorstein, H., (1994). The moderating effects of message framing and source credibility on the price-perceived risk relationship. Journal of Consumer Research 21,145-153.

[36] Robinson K, Crenshaw E. Reevaluating the global digital divide: socio-demographic and conflict barriers to the Internet revolution. Sociol Inquiry 2010;80(1):34-62.