

# Financing Innovative Development in Sub-Saharan Africa: The Role of Payment Systems

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**Abstract:** Electronic payments like mobile money services have been associated with unprecedented access to financial services in economies, where a large section of the population was underbanked or unbanked due to either lack of bank branches or their proximity. However, the continuous development of electronic payment systems, especially mobile payment in sub-Saharan Africa has brought about a rise in volume of cashless transactions, thereby reducing the use of cash for payment. This, therefore, promotes financial inclusion among the most vulnerable as it offers those without access to the formal banking system a safe and efficient payment alternative to cash. Also, electronic payment usage is also seen to have enormous benefits to governments as it could potentially help collect more tax revenue by providing a clear electronic trail and transparent transactions that can readily be taxed. This study investigates how mobile money services influence innovative economic growth. A linear regression analysis was conducted on sub-Saharan African data for period 2011-2018 and the study reveals that mobile services and payments system have significant positive effects on economic growth, hence innovative development in the region. The study concludes that mobile payment service or system is critical aspect of financial intermediation in sub-Saharan Africa as it offers them means through resources from both the banked, underbanked and unbanked populations could be attracted into the formal financial system, thus capable of facilitating innovative economic growth in the region.

## 1. Introduction

An efficient payment system is essential for ensuring the stability and soundness of a financial system, as a well-functioning payment system enables timely completion of financial transactions and this also enhances job creation and economic growth, and hence better standard of living. Thus, an overall improvement in payment systems ensures a smooth growth of the entire economy and its inter-linkages with the fiscal, external and the real sectors. Payment systems usually consist of a wide range of institutional arrangements and processes that aid the movement of monetary claims between two or more economic actors. These institutional arrangements and processes may consist of payment streams like Real Time Gross Settlement, Cheque Codeline Clearing, and Clearing House and thus including direct credit and direct debit. Payment system consists of a set of instruments, banking processes as well as interbank funds transfer systems that facilitate money circulation in an economy, hence it is a means through which funds can be transferred within or across an economy (SARB, 2015). It is worth noting that, payment systems do not only involve interbank payments, but also include the overall payment procedures, thus consisting of the processes, mechanisms, agreements, systems, institutions, rules and laws. These systems ensure in maintaining financial stability and also reduce the costs and uncertainty of settlements or transactions, which could otherwise impede the day to day economic activities both at the national and regional level (Bank for International Settlement, 2005).

As the name implies, a national payment system involves all activities, mechanisms, procedures,

infrastructure, systems, institutions and users related to payment or settlement of transactions in a country. Ideally, participants of national payment system must work towards a particular direction as to how they want their payment system to evolve, by considering the consumer demands and certain realities of that country, thus the payment system of a country depending of the nature of that economy encompasses a host of different features like ICT networks, road and servers are used by economics actors of the real economy, various channels and instruments and for processing of payment. As such a well-functioning payment infrastructure has been described as a crucial instrument, capable of: enhancing the efficiency financial system as well as financial markets; facilitating better economic interaction and trade; and also boosting consumer confidence (ECB, 2010). Likewise, Humphrey et al. (2006) argued that inefficient payment systems are capable of hindering the efficient transfer of funds among economic actors. Payment markets have undergone various important and continuing challenges as well as opportunities in the form of regulatory and market initiatives and competition over the past decades. Also, according to Humphrey et al. (1996) rapid technological advances have necessitated the need to migrate from traditional paper system to various e-payment systems. In the same vein, Oginni (2013) posited that technological innovation has altered horizon of payment systems, thus drifting towards e-World. Regardless of the relative importance and latest developments in the field of payment markets, however, there exists a rare or rather sparse empirical literature on retail payments (Hasan et al., 2012). Thus, this paper was inspired by the various new developments relating payment systems in African, and thus it aims at contributing to the strand of literature by espousing the role of payment system infrastructure from an innovative perspective. It examines the fundamental relationship between the retail payment markets and the real economy. The linkage between the level country's retail payment infrastructure (market) and its impact on the real economic growth like say GDP, trade and household consumption. Also, we show that the need to integrate and harmonize retail payment system so as to foster trade and consumption, which would thus bring about a beneficial effect for the overall economy and its growth.

## **2. Literature Review**

The recent rapid growth of electronic payment system is seen as all-encompassing and depicting different dimensions of electronic delivery multichannel. Electronic payment could therefore be understood from its functions as online banking, internet banking, e-banking, m-payment, e-money, e-finance, e-broking, and so on. Yet, there have been various attempts in researches to define e-payment (Humphrey et al. 2006; ECB, 2001). For instance, ECB (2001) views e-payment as an electronic safeguarding of economic substance on a device generally employed to make payments of undertakings without necessarily involving bank accounts in the transaction, but serving as a prepaid bearer instrument. E-payment is seen to be the use of credit cards, ATMs, debit cards, stored value cards, mobile wallets and other kinds of payment methods to make payments (Oginni, 2013). In the same way, Humphrey et al. (2001) refer to e-payments as a payment service that utilizes information and communications technologies comprising Integrated Circuit (IC) cards, cryptography and telecommunications. And in this study, we see e-payment as a delivery multichannel, which ensures the electronic exchange of monetary substances with or without physical contact of the parties undertaking the transactions. Thus involves all electronic transactions and e-cheque payments. E-payment therefore offers the means of doing business and settling financial commitment electronically without necessarily moving cash in a cashless society. The development electronic payment systems have come not without controversies, thereby calling for more research to examine this field, especially in developing regions like Africa. In line with this, a very high cash usage in Nigeria was noticed in the assessment of the user acceptability and problems of electronic retail payment systems in country, despite the various efforts put in place towards the adoption of electronic payment system. Some of the challenges identified in their study include lack of socio-cultural support, inadequate critical technological infrastructures, inadequate power supply,

and poor regulatory framework needed to operate effective electronic payment system (Echekoba et al., 2011). Also, according to Odior et al (2012) a shift towards a cashless payment system in the biggest economy in Africa appears to be beneficial, however, there is a high level of concerns with regards to security and management of cost savings associated with its implementation.

Researches are pointing out the impacts of mobile money monetary and financial stability and its implications for policy instruments are theoretically ambiguous and, hence must be supported with empirical analysis. Most of the few existing literature focuses on this payment system impact on inflation, but the overall outcome of such studies proves that mobile money has either a moderate impact or no impact on inflation. For instance, Weil et al (2012) posited that the monetary implications of mobile money in Kenya were negligible, and in Uganda no evidence was found on the link between mobile money and inflation by Aron et al (2015). In the same vein, Adam and Walker (2016) concluded that mobile money should enhance the macroeconomic stability of countries but cannot rather destabilize the conduct of monetary policy. However, with regards to the impact mobile payment system on financial stability and commercial banks, there are a mixed or controversial evidence as early study noticed a negative correlation between mobile money and banks' liquidity positions, thus could have an impact on banks' ability of mobilizing savings and deposits (Kamukama & Tumwine, 2012). Conversely, very recent studies have proved otherwise by emphasizing that mobile money is a positive driver of private sector credit and the payments infrastructure, and could serve as a conduit through which users becoming banked, hence boosting financial inclusion (Nampewo et al., 2016). Similarly, some studies have examined the effect of mobile money and mobile financial services on individual or groups of commercial banks, focusing Kenya, concluded that there exists have a positive effect or otherwise no impact on commercial banks' performance (Kinyanzui et al., 2018).

### **2.1. Payment Systems in Sub-Saharan Africa**

The landscape of payment system in sub-Saharan African economies according to McKinsey (2016) is still evolving with the help of ongoing innovation, with the emergence of new market players and also the development of alternative payment solutions. A surge in low-value, high-volume retail payments in the region that is being stimulated by the rising demand for electronic payment services and instruments including mobile money. The required infrastructure, regulation and payment landscape are still not fully put in place guarantee the optimal development of payment services in sub-Saharan African region, not with the breakthroughs in the field of innovation. Thus, there is continuous absence of a harmonized payment system including inefficiencies like duplication of infrastructure that is often expensive to maintain and/or ill-suited to underdeveloped countries. Correspondent banking relationships is predominate in existing ecosystem for cross-border payments in the region, but as there is an increase in regional economic and open trade integration among member states, the current fragmented national payment systems could serve as a stumbling block to the achievement of larger goals associated with economic development and cooperation. Sub-regional payment systems (international mechanisms), which are evolving across the region are intended to ease payments among residents of member countries. They include: SADC Real-Time Gross Settlement System (RTGS); West Africa Economic and Monetary Union; East Africa Payment System (EAPS); The Economic and Monetary Community of Central Africa (CEMAC); Regional Payment and Settlement System (REPPS); Regional SADC Clearing House (RACH).

Digital payments developing in large scale, especially, mobile is fast growing and becoming systemically and strategically very important in some economies of sub-Sahara Africa, thus providing the means to leapfrog poor infrastructure of pre-existing payment systems, although, this is still constrained by cash preference in some African societies. With regards to the role of mobile payments, for instance in Tanzania, in 2015 the value of these payments was reported to be over USD20 billion, far beyond any other channel or instrument. Figure 1 illustrates the trends of mobile money development in sub-Saharan Africa. Despite these great strides, mobile money is yet to achieve its full potential as most consumers or sellers still prefer the use of cash pay for goods and

services. Thom et al (2017) found that in Madagascar, for instance, still about 99% of residents' expenses are settled in cash. Bester et al. (2016) think that a growing uptake of digital payments needs a quick access to sufficient cash-in and cash-out points until when there is a full digitized payments ecosystem. Also, interoperability is another one important step capable of helping to achieve economies of scale, as interoperable payment systems facilitate the unified involvement of various proprietary payment acceptance and processing platforms as well as various payment products. Thus, W3C (2014) posits that this encourages competition and efficiency advantages by achieving economies of scale and to unlock the network of effects associated with interoperability like the benefits of scale, the a reasonable mass of service providers are supposed to be interoperable.

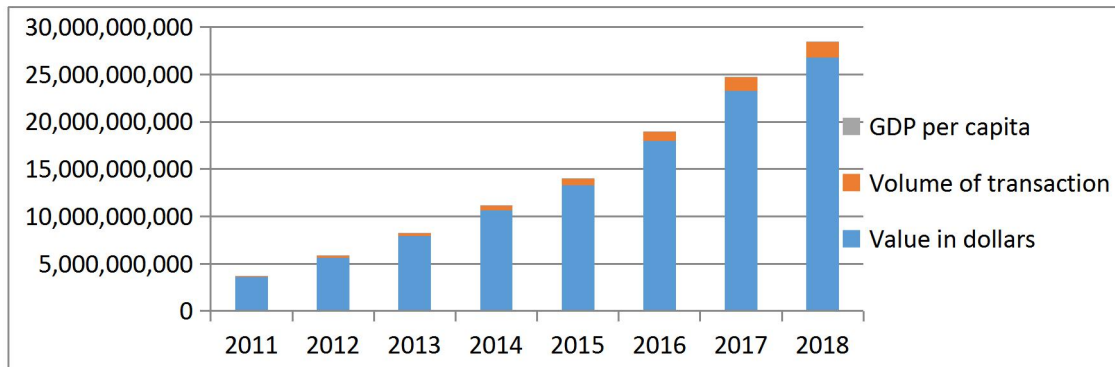


Figure 1 Trends of mobile money transactions and GDP per capita in SSA

As can be seen in the above, the overall volume and value of mobile in the region has been increasing from year to year since 2011, and has increased about 7 times in size in the 2018. This, therefore, calls for need to analyze the impact of this mobile payment haven stood out as the biggest payment platform in the region.

### 3. Methodology

The dataset includes sub-Saharan African region and comprises of annual information covering the 2011-2018 period, and the choice of time period was dictated by data availability. Table 2 provides the summary statistical data used for analysis. To proxy economic growth, GDP per capita was used, while independent variables include: overall annual value (in US dollar) of mobile money transactions, total yearly volume of transactions.

Table 2 Summary statistics

Variable	Obs.	Minimum	Maximum	Mean	Std. deviation
GDP per capita (A)	7	3349.328	3968.675	3737.375	204.575
Value in dollars (B)	7	3568106003.000	26806458086.000	14777975833.286	8356113780.480
Volume of transaction (C)	7	173065536.000	1670341027.000	855184411.286	561135656.588
Number of active agents (D)	7	90934.000	1400815.000	741301.000	460504.199
Number of registered agents (E)	7	155618.000	2327945.000	1254487.000	768329.817
Spread of live mobile money services (F)	7	61.000	135.000	118.000	26.312

Source: Data from the GSMA State of the Industry Report (2019)

To ensure that our results are not bias, the following three control variables like number of active mobile money agent, overall registered agents or outlets of mobile payments and the spread of live mobile money services are included in the relationship. In order to investigate the impact of mobile payment system in sub-Saharan Africa, it was necessary to examine using the following basic linear regression (equation 1):

$$\text{GDP growth (A)} = \beta_0 + \beta_1(B)_i + \beta_2(C)_i + \beta_3(D)_i + \beta_4(E)_i + \beta_5(F)_i + \epsilon_i \quad (1)$$

This would help in ascertaining the correlation between the proxy variable of economic growth and the explanatory as well as control variables.

**4. Results and Discussion**

After running the regression analysis using the above equation, the following results were obtained (the correlation matrix Table 3).

Table 3. Correlation values

	Value in dollars	Volume of transaction	Number of active agents	Number of registered agents	Spread of live mobile money services
Value in dollars	<b>1</b>	0.995	0.998	0.998	0.766
Volume of transaction	0.995	<b>1</b>	0.990	0.989	0.717
Number of active agents	0.998	0.990	<b>1</b>	1.000	0.791
Number of registered agents	0.998	0.989	1.000	<b>1</b>	0.800
Spread of live mobile money services	0.766	0.717	0.791	0.800	<b>1</b>
GDP per capita	0.907	0.875	0.927	0.932	0.944

The correlation matrix tests the multicollinearity among independent variables including the dependent variable and corresponding standard deviations show substantial variations, and therefore, making it possible to obtain reasonable estimated nexuses from the regressions. It can be noticed from correlation matrix that the variables used are positively correlated to GDP, which is the proxy for economic growth.

Table 4 below presents the regression model parameters. The summary of regression analysis, where GDP per capita was employed as the proxy variable for economic development, and It is obviously clear from model parameters that the model with 0.126 and 0.994 as the p-value and R-squared values, respectively.

Table 4. Model parameters (GDP per capita)

Source	Value	Standard error	t	Pr >  t	Lower bound (95%)	Upper bound (95%)
Intercept	3304.791	50.946	64.868	<b>0.010</b>	2657.460	3952.121
Value in dollars	0.000	0.000	-4.401	0.142	0.000	0.000
Volume of transaction	0.000	0.000	0.282	0.825	0.000	0.000
Number of active agents	0.001	0.001	2.231	0.268	-0.007	0.010
Number of registered agents	0.000	0.000	0.369	0.775	-0.005	0.005
Spread of live mobile money services	2.770	0.584	4.746	0.132	-4.646	10.185

The p-values indicate the reliability and the significance of the model, while the R-squared values prove the significant relationship between economic growth the other independent and control variables used in this study. Also given the t-values, which test the hypothesis of confidence level (not more than 1.96) and also indicate the degree importance of each variable, in this case overall value in dollars of mobile payment is the most important follow by number of registered mobile payment agents. The results, therefore, support Goa et al. (2018) and Oginni et al. (2013) that e-payments have positive effects on economic growth and also the hypothesis that the electronic payments like mobile money has a positive impact on economic growth (SARB, 2015) it facilitates

money circulation across an economy, thus boosting economic development in that particular country or region as found in sub-Saharan Africa.

## 5. Conclusion

This paper uses the current database on mobile payment across countries of sub-Saharan Africa and with the help of econometric techniques, investigates the impact of electronic payments, specifically mobile money payment on economic growth in sub-Saharan Africa. The paper highlighted various theoretical frameworks and supported it with stylized facts. The statistical analysis reveals that there is a positive correlation between almost all indices of mobile payment system and economic growth in sub-Saharan. Nevertheless, according to Porteous (2009) the acceptability rate of electronic payments highly hinges on individual perception of the following attributes on innovative development like convenience, simplicity, accessibility, security, cost and flexibility. Thus, various individual perceptions of innovative development have direct effects on the readiness to adapt (use) and the real usage of a given innovation (Venkatesh and Davis, 2000). Mobile payment is a new technology globally, hence can be adopted or rejected in certain societies depending on their perceptions (Ngugi et al., 2010). Mobile payment facilitates and is a strongest determinant human development, especially in developing countries, and with credible monetary policy, urban population and infrastructure could be great contributing factors to stimulate mobile payments and banking development in Africa. We therefore recommend that policymakers in their pursuit of good performance in terms of electronic payment systems, especially mobile payment should implement policies mainly oriented towards credible monetary policy, supporting infrastructure, and human capital development as this could boost the role played by mobile payment system in the region, hence encouraging economic development.

## References

- [1] SARB. *Annual Oversight Report: National Payment System Department*. South African Reserve Bank, 2015.
- [2] Bank for International Settlements (BIS). “*General guidance for, Bank for International Settlements*”, Press release, 2005, retrieved from <https://www.bis.org/cpmi/publ/d69.htm>
- [3] European Central Bank (ECB). “*Payment and Securities Settlement Systems in the European Union*”, Frankfurt, Germany: Blue Book, 2001, pp. 1-80. Retrieved <https://www.ecb.europa.eu/pub/pdf/other/ecbbluebook2001en.pdf?e58d96b25d1c820c4e47fda8419e3126>
- [4] Hasan, I., De Renzis, T. & Schmiedel, H. “*Retail Payments and Economic Growth*”, Bank of Finland Research Discussion Papers 19, 2012.
- [5] Oginni, S. O. “*Impact of Electronic Banking on Commercial Banks’ Performance*”, Lap Lambert Academic Publishing, 2013. Germany: Saarbuckten. ISBN 978-3-659-42758-9.
- [6] Humphrey, D.B., Pulley, L.B. & Vesala, J.M. “*Cash, Paper, and Electronic Payments: A Cross-Country Analysis*”, *Journal of Money, Credit and Banking*, 1996, vol. 28(4), pp. 914-39
- [7] Humphrey, D.B., Kim, M. & Vale, B. “*Realizing the Gains from Electronic Payments: Costs, Pricing, and Payment Choice*”, *Journal of money credit and banking*, 2001, vol. 33(2):216-34
- [8] Humphrey, D.B., Willeson, M., Bergendahl, G. & Lindblom, T. “*Benefits from a changing payment technology in European Banking*”, *Journal of Banking and Finance*, 2006, 30.
- [9] Echekeba, F.N. & Ezu, G.K. “*Electronic Retail Payment Systems: User Acceptability and Payment Problems in Nigeria*”, *Arabian Journal of Business and Management Review (OMAN Chapter)*, 2011, vol. 1, No.5.
- [10] Odior, E. S. & Banuso, F.B. “*Cashless banking in Nigeria: challenges, benefits and policy implications*”, *European Scientific Journal* June edition, 2012, vol. 8, No.12 ISSN: 1857-7881 (Print) e -ISSN 1857-7431

- [11] Aron, J., Muellbauer, J. & Sebudde, R. “*Inflation forecasting models for Uganda: is mobile money relevant?*”, CSAE Working Paper WPS/2015-17, 2015.
- [12] Weil, D., Mbiti, I. & Mwega, F. “*The Implications of Innovations in the Financial Sector on the Conduct of Monetary Policy in East Africa*”, University of Nairobi (School of Economics), 2012. Retrieved from <http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/45723>
- [13] Adam, C. & Walker, S. “*Mobile Money and Monetary Policy in East African Countries*”, 2016, pp. 1-30. Retrieved from [https://editorialexpress.com/cgi-bin/conference/download.cgi?db\\_name=CSAE2016&paper\\_id=277](https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=CSAE2016&paper_id=277)
- [14] Kamukama, N. & Tumwine, S. “*Mobile Money Services: A Liquidity Threat to Uganda’s Commercial Banks.*”, African Journal of Accounting, Economics, Finance and Banking Research, 2012, vol. 8(8), pp. 33-46.
- [15] Bank of Ghana (BOG). “*The Impact of Mobile Money on the Payment System in Ghana: An Econometric Analysis*”, Payment Systems Department of BOG, 2017.
- [16] Nampewo, D., Tinyinondi, G., Kawooya, D., & Ssonko, G.W. “*Determinants of private sector credit in Uganda: the role of mobile money*”, Financial innovation, 2016, vol. 2(13). DOI: 10.1186/s40854-016-0033-x
- [17] Thom, M. & Weideman, J. “*MAP Madagascar diagnostic and roadmap to financial inclusion*”, Cenfri, FinMark Trust, UNCDF, Cether, 2017.
- [18] W3C. “*W3C Web Payments Workshop -PSDG Note*”, 2014. Retrieved from [https://www.w3.org/2013/10/payments/papers/webpayments2014\\_submission\\_29.pdf](https://www.w3.org/2013/10/payments/papers/webpayments2014_submission_29.pdf) (Accessed on 15 September, 2019).
- [19] Global System for Mobile Communications (GSMA). “*State of the Industry report Mobile Money*”, 2017. Retrieved from [www.gsma.com/mobilemoney](http://www.gsma.com/mobilemoney)
- [20] McKinsey. “*Digital Finance for All: Powering Inclusive Growth in Emerging Economies*”, McKinsey Global Institute, 2016. Retrieved from <https://www.mckinsey.com/featuredinsights/employment-and-growth/how-digital-finance-could-boost-growth-in-emerging-economies>
- [21] Porteous, D. “*Mobilizing Money through Enabling Regulation*”, Innovations, 2009, 4 (1): 75–90.
- [22] Gao, X., Wang, M. & Zhang, N. “*Payment-System Development and the Real Economy: Implications from India’s Demonetization*”, 2018. Retrieved from <http://dx.doi.org/10.2139/ssrn.3176366>
- [23] Oginni, S.O., Gambo, E.J., Abba, M., & Onuh, M.E. “*Electronic Payment System and Economic Growth: A Review of Transition to Cashless Economy in Nigeria*”, International Journal of Scientific Engineering and Technology, 2013, vol. 2(9), pp. 913-918.
- [24] Ngugi, B., Pelowski, M., & Ogembo, J.G. “*M-Pesa: A Case Study of the Critical Early Adopters. Role in the Rapid Acceptance of Mobile Money Transfer in Kenya*”, The Electronic Journal on Information Systems in Developing Countries, 2010, vol. 43(3), pp. 1-16.
- [25] Venkatesh, V. & Davis, F.D. “*A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies*”, Management Science, 2000, vol. 45(2), 186204.
- [26] Aker, J. C., & Mbiti, I.M. “*Mobile Phones and Economic Development in Africa*”, Journal of Economic Perspectives, 2010, vol. 24 (3): pp. 207–32.
- [27] Aker, J. C., & Blumenstock, J. E. “*The Economics of New Technologies in Africa*”, In The Oxford Handbook of Africa and Economics, Vol. 2, edited by C. Monga and J. Y. Lin, 353–71. Oxford: Oxford University Press, 2015.
- [28] Aker, J.C., Boumniel, R., McClelland, A. & Tierney, N. “*Payment Mechanisms and Anti-Poverty Programs: Evidence from a Mobile Money Cash Transfer Experiment in Niger*”, Economic Development and Cultural Change 2016, vol. 65 (1): pp. 1–37.