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Electronic Payments in Sub Saharan Africa: Will Mobile Telephony Accounts Systems be the Next Leapfrog Technology for Development? [1]

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This paper examines Sub-Saharan Africa's ability to use mobile telephones to make electronic mobile payments. As most of these technologies are out of reach to the vast majority of African consumers, only mobile phones are examined in this paper. And indeed, mobile phones provide --or can provide-- important alternatives for literally millions of Africans. Already in 19 sub-Saharan nations mobile phones account for three quarters of all telephones, and in several countries, e.g., Benin and Kenya, that ratio is higher. And, although e-commerce is in its infancy stages in the region, this may well change in the near term. Access to information and communication technologies is essential to economic growth and development. However, until recently, most people in sub-Saharan Africa were denied this access.

Field or Research: Development Economics

1. Introduction

There is a growing body of literature exploring the value of mobile electronic payments in economic development.[/2] However, there is very little which looks specifically at Sub-Saharan Africa. This paper will try to begin to fill that gap in the literature.

Sub-Saharan Africa finds itself on the wrong side the great global digital divide and is beset with economic problems: low levels of income, literacy, education, and health care, limited access to clean water, and high levels of AIDS, malaria, civil strife, and poor physical infrastructure.

The majority of the population lives under the international poverty line of US$2 per day. For the past three decades Gross Domestic Product (GDP) growth has barely outpaced population growth[/3] While there is no one solution to these problems, mobile phone electronic payments may provide a much-needed "leap frog" technology to assist with economic development.

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Electronic mobile payments may be defined as, "… payments using wireless devices such as mobile phones and personal digital assistants (PDAs), wireless tablets and mobile computers."[4] Since most of these technologies are out of reach to the vast majority of African consumers, only mobile phones are examined in this paper. And indeed, mobile phones provide --or can provide-- important alternatives for literally millions of Africans. Already in 19 sub-Saharan nations mobile phones account for three quarters of all telephones, and in several countries, e.g., Benin and Kenya, that ratio is higher.[5] And, although e-commerce is in its infancy stages in the region, this may well change in the near term.[6] Access to information and communication technologies is essential to economic growth and development. However, until recently, most people in sub-Saharan Africa were denied this access.

2. The Growth and Use of Mobile Phones in sub-Saharan Africa

Mobile phone technology has tremendous impact on economic development. Indeed, recent studies suggest that an extra 10 mobile phones per 100 people in a typical developing country increases GDP by 0.6%.[7] The number of mobile users is growing twice as fast in developing countries as in developed countries, and Africa is now the fastest-growing mobile phone market in the world. According to the GSM Association, over 85% of the population will have network coverage by 2010, up from 10% in 1999 and 60% in 2007. The number of subscribers has grown from around 4 per 100 in 2003 to over 10 per 100 in 2005.[8] This is a dramatic increase even since 2003 (see table 1, below):

Table 1. Telephone and Mobile Phone Availability in Sub-Saharan Africa 2003

Telephones (landlines per 100 people)	1.5
Waiting list (thousands)	192
Mobile phones (per 100 people)	3.7

Source: World Bank. *African Development Indicators 2005*. Washington, DC: IBRD, 2006.

Mobile phones can play a significant part in promoting bottom-up socio-economic development, even among the poorest countries. Mobile phones are not as expensive nor do they require the same levels literacy as other new technologies such as computers or the internet, making them more accessible. They do not depend on a constant source of electricity or high maintenance. Further, the value of mobile phones to the individual is greater in developing countries because generally most countries' basic information infrastructure, including their postal systems and fixed-line phones, are very inadequate.

Many people who cannot afford to own a mobile themselves can access mobile services through informal sharing through community phone shops. Given the low incomes and difficulty for individual purchasers, the South African firm Vodacom has offered 24,000 community phones to rural areas, where there are few or no fixed line phones. These community phones are owned and operated by local businesses franchises as phone shops. According to Vodafone, more than 20,000 jobs have been created and the shops help attract many other businesses, boosting local economies. In addition, the system is helping to empower black entrepreneurs, with around 40% of franchises held by women.[9]

Samuel and Hadingham conducted a survey in 2005 in the region. They found that 62% of the small businesses surveyed in South Africa and 59% in Egypt said they had increased profits as a result of mobile phones, in spite of increased call costs. And 85% of those surveyed in Tanzania and 79% in South Africa said they had more contact and better relationships with family and friends as a result of mobile phones.[10]

3. Mobile Telephony Accounts Systems and Electronic Payments

According to the OECD, "The role of a payment system is to provide a way of transferring value between different parties in the economy…lower costs through efficient payment systems could have a positive impact on economic growth."[11]

Online payments systems and technologies are still emerging. There are several types, including credit cards, debit cards, smart cards, online banking, mediating systems (e.g. PayPal, Firstgate) and telephony account systems. This paper looks at a subset of telephony accounts systems, that of mobile phones.

Basically, mobile payments are transacted via wireless devices (for this paper, again, mobile phones). They can include mobile banking, where GSM/SMS systems are used to make payments with a financial institution (this is an alternative to PC-based systems). Another possibility is banked-based mobile mediation. This system allows the customer to pay a desired payment amount using a personal PIN account (an example would be Austria's Paybox). The mediation service would then deduct payment from the customer's banking account and email a receipt. A similar technique would be a direct transfer, where the customer's mobile phone account is charged directly for a payment during a normal billing cycle or by using a pre-payment scheme. Smart card technology debits the purchase directly to the consumer's card, unlike mag-stripe cards that require dial up authorization. For example, Vodafone/T-Mobile has developed m-Pay Bill which is designed for small transfers deducted directly to the normal telephone bill or from pre-paid credit. Finally, an indirect method could be employed, whereby the customer pays for the service, the cost of which is passed along to the merchant by the mobile phone service. Such applications

can be used for mobile person-to-person (P2P) payments, business to consumer (B2C) or business to business (B2B). A Ghanan software company, TradeNet, is developing an e-Bay like system for agricultural products for a dozen countries in West Africa. Prices can be shared and settlements can be negotiated via individual bargaining or auctions. The service will be financed by advertisements, and subscribers will initially not be charged. And very importantly, "Mobile phones are becoming an increasingly popular way to make all sorts of payments."[12] Further, "The importance of digital content in e-commerce is likely to grow further with the increasing development of content for mobile platforms… The growing prominence of this type of product raises specific issues for online payments, most importantly suitable micro-payment options…".[13]

The use of such technology varies between countries. "In some countries, as for example Japan, mobile phones are used more frequently for payments than PCs."[14] Indeed, there, "… hundreds of thousands of transactions, from buying railway tickets to picking up groceries, already take place every day with customers passing their handsets across a device…".[15] However, in Germany only 3% of online shopping is done via mobile phones.[16] Visa Horizon in Ghana allows banking transactions. In South Africa, the government is developing a system making payments (pensions, housing grants, etc) electronically. Several banks now offer mobile phone e-payments.[17] In February 2007 a group of telecoms announced the startup of a 100 country network to facilitate remittances that relatives send home, estimated at more than US$250 billion annually.[18]

In sub-Saharan Africa, South Africa leads the way in mobile phone coverage and growth. However, South Africa has some of the lowest savings rates in the world, and access to banks is limited due to lack of locations in rural areas, bank fees (some of the highest in the world) and difficult application processes. Fewer than half of all South Africans hold bank accounts. Recently Standard Bank and MTN (a mobile phone firm) teamed up to provide service to those underserved by the traditional banking system. This system should encourage savings (as it would be safer than keeping cash at home), and provide an introduction into the formal economy.[19] The system will employ a security system that would only require a phone call and a government-issued identity number to subscribe. The accounts are linked to a MasterCard debit card or ATM card. Funds can be credited to other users, banks or business firms.

Fundamo, a leading South African mobile banking and payment firm, was awarded the 2006 Technology Leadership Award by Frost & Sullivan. The award recognized the importance of being able to have enabled organizations to provide much needed mobile banking services across Africa.[20]

The South African National Taxi Council is employing an electronic payment system for its entire fleet, using smartcard technology. This may evolve into mobile phone adaptability as well. [21]

4. Impediments to Online Payment Systems

There are significant obstacles for mobile online payment systems in the region. According to the OECD, "The use of any payment system involves direct and indirect costs. Direct costs are fees charged by financial payment service providers. Indirect costs include those related to the complexity of transaction processes, speed of transaction, risk and uncertainty, and opportunity costs for the buyers and sellers involved."[22] However, there are additional costs and constraints, and include the following, divided basically between demand side vs supply side:

Demand Side Constraints

Incomes

Over half of everyone living in sub-Saharan Africa lives on less than US$2 per day. With such low incomes, the price of a mobile phone is out of reach for many (although this can be ameliorated by group or village purchases, see above).

Social and cultural factors

According to a recent OECD study, "…national habits and specific industry characteristics matter for the use of online payment systems, and there are significant differences in payment markets by country and payment types."[23] For example, because of differing literacy and education levels, some customers may not know how to use the mobile phone devises. Customs may also interfere with the widespread use in remote, traditional areas.

Supply Side Constraints

Costs

The fixed costs of such systems are daunting. In addition, there are significant maintenance costs as well.[24] Firms can expect to sustain loses for some time before the sunk costs begin to be covered and profits generated.

Standardization

Several European telecoms (T-Mobile, Vodafone, Orange and Telefonica Moviles) tried to create a unified payments system in 2003, but were unsuccessful. The companies could not agree to a common system and they each began to develop their own individual ones.[25] In addition, cross-border transactions, which as promise to expand significantly, is hindered by lack of international standards. As individual or firm-specific standards proliferate, the chances for standardization decrease.

Regulations and government policy

Generally, mobile phone adoption is higher in countries with liberalized telecommunications markets. Government policy can be a help or a hindrance. For example, corruption slowed the licensing agreement in Swaziland by nearly

five years.[26] Another issue of concern are national tax systems for cross border transfers. Governments may be fearful of cross border exchanges which could bypass foreign exchange controls. Finally, just as too little regulation may stifle standardization, too much regulation can also slow adoption rates.

The Network and Free Rider Effects

Banks and other financial institutions (including credit card companies) have established networks already. However, new entrants would have to create new network infrastructures, thus providing a large barrier to entry, and thus protection to existing firms. In addition, merchants and consumers will be reluctant to adapt to these new services until a critical mass of others begins to evolve. This brings in the free-rider effect, whereby firms will hesitate to develop their standards in anticipation of heavy investment by rivals. Once the technology is developed, economies of scale may provide significant savings for new entrants. However, this could prove to be a vicious circle. Further, as suggested above, government regulations also provide significant entry barriers.

5. Conclusion

As this paper has suggested, there is great promise for mobile telephony accounts systems and electronic payments in sub-Saharan Africa. Indeed, such account systems "…may be widely applicable due to the very impressive growth and high penetration of wireless access compared to other telecommunication infrastructure."[27] Paying systems using a mobile phone is attractive to low income customers using pre-pay plans, or pay-as-you go options. However, all across the region, cash is still king. Can that change with new technology?

If mobile phones were combined with such payment functions, people could have access to banking services, reducing the need to carry cash, facilitating both local and long distance payments, and generally providing an introduction into the formal sector of the economy. There are of course many advantages for the customer. They include safety, ease of use and convenience. As economies of scale continue, costs are likely to drop even further. Mobile services can easily add special security advantages, especially SIM and encrypted PIN accounts. In many ways, two basic needs of people come together in the mobile phone device, i.e., the need for access to communications and to financial services. Additionally, mobile payments and mobile banking technology offers convenience, real-time/instant payments, more secure banking, direct control over banking and payments, affordability, new functionality and access to new transactional opportunities. Finally, pre-paid accounts can offer anonymity as merchants would have a more difficult time in data mining.[28] There are a number of other advantages mobile phones have over smart cards. For example, their screen shows data (such as balances, withdrawals and deposits), and with a keyboard such transactions can take place much more easily.

According to the Tower Group, mobile micropayments are projected to grow to nearly US$5 billion by 2009 (up from less than US$.5 billion in 2004)[29], whereas the management consultant firm Arthur D Anderson estimates that mobile phone payments could climb from US$3.2 billion in 2003 to US$37 billion by 2008.[30] And perhaps more importantly, B2C and B2B cross border payments appear to be increasing in importance.[32] Indeed, "Instead of widening the divide between a banking system that serves an urban elite, delivering high value services to a limited market, and a vast majority of the population that remains unbanked and therefore excluded from the formal market."[32]

This region may well benefit from this technology like no other region. "The technology revolution may be coming to poor countries via the mobile phone, not the personal computer, as it did in the rich ones. And just as the internet encouraged an entrepreneurial ethos…Africa's surge in mobile-phone use may unleash the same sort of business energy, but tailored to local needs."[33] Indeed, a developing country with an extra 10 phones per 100 people between 1996 and 2003 would have had GDP growth 0.59% higher than an otherwise identical country.[34]

Mobile payment technology may bridge the gap between emerging and first world economies, open up economic opportunities to rural communities and bring the informal sector closer to the formal. This in turn would stimulate further economic development and growth.

As Victor van Reijswould argues, "It is high time that African stakeholders start thinking about a mobile telephony based equivalent of PayPal, if they do not want to miss the second wave of e-commerce for the consumers and the small businesses at the continent."[35]

It is too early to conclude that mobile phone payments will make significant contributions to economic development in sub-Saharan Africa. Nonetheless, it is an issue that deserves much more investigation. Unfortunately, much of this paper has to depend on antidotal evidence, as the hard data is now lacking. As little research as been done on the applicability of mobile telephony electronic payments in sub-Saharan Africa, this paper makes the argument for additional research in this important area.

Endnotes

[1] An earlier version of this paper was presented to the Fifth International Business Research Conference, “Strands of Development”, April 2007, Dubai, UAE.
[2] OECD 2006, Berger, and Deyoung, 2006, Gowrisankaran, Gautam, and Stavins, 2004, Green 1999, Larson, 1999, Mantle, 2001, Stojanovic, 2001, Weiner, 1999.
[3] Sparks, 2006.
[4] OECD, 2006
[5] The Economist, 2005
[6] van Reijswould, 2006
[7] The Economist, 2005
[8] The Economist, 2007
[9] Samuel, Shah and Hadingham, 2007, Fundamo, 2006
[10] Samuel, Shah and Hadingham, 2007
[11] Samuel, Shah and Hadingham, 2007
[12] The Economist, 2007a
[13] OECD, 2006
[14] OECD, 2004
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[16] Krueger, 2004
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[20] Fundamo, 2006
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[22] OECD, 2006
[23] OECD, 2006
[24] Mantle and McHugh, 2001
[25] OECD, 2004
[26] Sparks, 2006a
[27] OECD, 2006
[28] OECD, 2006
[29] Tower, 2004
[30] The Economist, 2007a
[31] Federal Reserve Bank of Chicago, 2004
[32] Moroney, 2007
[33] The Economist, 2007
[34] Fundamo, 2006
[35] Reijswould, 2006

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