Preliminary insights into the influence of mobile phones in micro-trading activities of market women in Nigeria

Richard Boateng
University of Ghana Business School

Robert Hinson
University of the Free State Business School

Rakiya Galadima
PearlRichards Foundation

Longe Olumide
University of Ibadan

Abstract
This paper explores the influence of mobile phones on the micro-trading activities of women traders in Nigeria. This exploratory study adopts a qualitative research approach. A theoretical model based on the Technology Acceptance Model is used to analyse two case studies of the micro-trading activities of Nigerian market women. The findings suggest that, first, the benefits obtained by market women tend to be partly influenced by the extent of mobile access and usage by trading partners in their value chain. Second, the knowledge of the trader plays a critical role in determining the type of mobile functionality used. Market women who innovatively integrate mobile services, like mobile banking, stand to reform their market structural processes and become more economically empowered. In micro-trading activities, enhancing communication and trading processes through mobile phones improves revenue acquisition and enhances decision making and control. The research concludes with an emphasis for research and practice to increase the mobile capabilities of those at the 'bottom of the pyramid' to beyond voice calls and text messaging. Research propositions and lessons for future research are also outlined. This paper generates new insights about the usage of mobile telephony for the enhancement of economic effectiveness of micro-traders.

Keywords
mobile telephony, m-commerce, micro-trading, adoption, usage, market women, technology acceptance, Nigeria

The 'mobiles for development' movement should consider educating traders on mobile functions and services that can enhance their trading activities.

Introduction

The last five years have witnessed a tremendous growth in telephone and mobile phone ownership and use in developing countries (International Telecommunication Union 2011, 2012). No technology has ever spread faster around the globe than the mobile phone. Until the mid-1990s, telephones in developing economies were primarily in cities or urban areas. Some African countries had only a single telephone for every 1,000 people (Panos Brief 2005). As of 2007, there were approximately 38 telephone subscribers and 275 mobile subscribers per every 1,000

Corresponding author:
Dr Robert Hinson, University of the Free State Business School, University of the Free State, PO Box 339, Bloemfontein 9300, South Africa.
Email: hinsonrobert@gmail.com

people in Africa (International Telecommunication Union 2007). In Nigeria, there has been a dramatic growth of over 4000 percent in nine years–increasing from a mobile penetration rate of approximately 13 mobile subscribers per 1,000 inhabitants in 2002 to 586 mobile subscribers per 1,000 in 2011 (International Telecommunication Union 2011). Recent reports from the Nigerian Communications Commission note that current mobile subscribers in Nigeria are more than 100 million–106,892,750–as of September 2012 (Nigerian Communications Commission 2012). Considering this rapid diffusion of mobile phones, there is a potential impact on socio-economic development if developing countries can harness this technology. This potential impact becomes pronounced when the information needs of micro-enterprises are taken into account.

Previous research on mobile telephony and mobile commerce has encompassed themes like mobile phones and service quality (Seth et al. 2007), mobile commerce (m-commerce) opportunities (Frolick and Chen 2004), implications of m-commerce for markets and marketing (Mylonakis 2004), and analysing the m-commerce value chain (Barnes 2002). Other m-commerce studies have focused on Asia (Xu 2003; Kini and Thanarithporn 2004) which is the continent with the largest mobile phone markets.

Research on mobile phones in sub-Saharan Africa (SSA) has covered mobile phones, fishermen and farmers in Ghana (Boadi et al. 2007); mobiles and market traders in Ghana (Boateng 2011); cellphone banking in South Africa (Ivatury and Pickens 2006); mobile phones and development in Nigeria (Heeks and Jagun 2007; Jagun et al. 2007); mobile phone ownership and social capital in Tanzania and South Africa (Goodman 2005); and m-commerce implementation in Nigeria (Charles et al. 2007). These studies highlight a call for more studies exploring the impact of mobile phones on micro-enterprises and micro-trading activities. Heeks' and Jagun's (2007) study on the impact of mobile phones on the cloth-weaving sector suggests that mobile phones have an economizing effect on supply chain processes but no significant restructuring effect on the organization of supply chains. The authors recommend that, since the study presents one of the first case studies of the impact of mobile phones on the supply chain of micro-enterprises, future research should explore the impact of mobile phones on the supply chain in other forms of trading to draw firm conclusions. This need

for more research on other groups of occupations or forms of micro-trading is also emphasized by Boadi et al. (2007) and Boateng (2011).

Yet again, in a recent review of mobile phones and financial services in developing countries, Duncombe and Boateng (2009) point out the preponderance of research studies documenting the design and adoption of mobile phones without examining needs and impact on the poor. They argue that it is challenging to conceptualize the needs and impact of mobile phones with one theoretical model or theory since a complexity of factors affect the poor and their livelihood activities. Thus, future research will require a more comprehensive approach to study the adoption, usage and impact of mobile phones in developing countries or resource-poor contexts. In a study of mobiles and micro-trading in Ghana, Boateng (2011) attempted to respond to this call. The study offers evidence of how mobiles contributed to transformational and incremental effects on the trading activities of market women and also suggested the need for more studies to explore such findings in other contexts to enhance understanding.

We respond to these calls for research by Boadi et al (2007), Heeks and Jagun (2007) and Duncombe and Boateng (2009) by researching mobile commerce, adoption, use and impact on the trading activities of Nigerian market women. This paper explores the dynamics between mobile phones and micro-trading among Nigerian market women. Nigeria has been chosen as the research site because it exhibits relative resource poverty as compared to other developing countries and has the largest mobile industry in Africa (Reed 2008). Nkamnebe (2008) notes that Nigerian women represent about 65 percent of the active population, and despite their multi-dimensional roles are forced into the informal economy and thus into poorer livelihoods. Charles et al. (2007) note that there are enormous opportunities for m-commerce in Nigeria based on the rate of diffusion of mobile devices. As Africa's most populated country, the rapid diffusion of mobile technologies presents a higher potential of harnessing the technology for development concerns and providing lessons for other developing countries.

This exploratory study adopts a qualitative research approach to explore the adoption, use and impact of mobile phones on the trading activities of Nigerian market women. The underpinning research question is *"how do mobile phones influence the micro-trading activities of market women in*

Table 1. Features of m-commerce.

Basic Features	Turban and King (2002)	Michael and David (2003)	Stanoevska-Slabev (2003)

Ubiquity
  Easier information access in real-time
  Communication independent of the user's location
	Ubiquity	Ubiquity	Ubiquity

Accessibility
  Contacted anywhere anytime
  The choice to limit their accessibility to particular persons or times
	Instant Connectivity	Accessibility	Immediacy/Time

Personalization
  Preparation of information
  Creating services that customize the end-user experience
	Personalization	Personalization	Personalization

Localization
  Knowing where the user is located at any particular moment
  Match services to their location
	Localization	Localization	Identification

Nigeria". A theoretical model based on the Technology Acceptance Model is used to analyze case studies of two Nigerian market women.

The paper is divided into six sections. Section one covers the introduction of the paper. In section two we examine mobile commerce and develop research constructs on mobile phone adoption and usage. Section three presents the research framework and methods for the research. Section four presents the case studies of market women. The analysis of the case studies is presented in section five. The conclusions and directions for future research are discussed in section six.

Concept of mobile commerce

Several definitions of m-commerce have been put forward by different scholars (see Boadi et al. 2007; Charles et al. 2007). These definitions consider m-commerce as being either just one of these conceptualizations–a technology, a product or a service–or as a combination of the three. This research conceptualizes m-commerce as all the activities related to a potential commercial transaction conducted through telecommunications networks for the exchange of information, goods and services that interface with wireless or mobile devices (Tarasewich et al. 2002; Turban et al. 2002).

Hence, m-commerce is not just a transaction, but extends to the provision of services and information. Mobile phones present a number of features through which diverse functionalities, applications and services are provided. These functionalities and services provide customers with added value and benefits. In examining the features of m-commerce, Bertrand et al. (2001) state that m-commerce is a unique combination of time, location and personalization. Other research has indicated more features–currentness, immediacy, instant connectivity and identification–which are also related to time, location and personalization (Turban et al. 2002; Michael and David 2003; Stanoevska-Slabev 2003; Zeng et al. 2003). These features of m-commerce are summarized in Table 1.

Concerning localization, the deployment of geographical information technologies, such as the Global Positioning System (GPS), enables companies to know users' whereabouts and offer goods and services specific to their location (United Nations Conference on Trade and Development 2002). Convenience and cost are benefits that can be derived from this functionality, as services can be conveniently matched to user or customer locations and cost savings can accrue at the same time. Concerning immediacy, time and accessibility, mobile phones enhance the mobility of consumers, offering opportunities to access, share or exchange information in transactions at a distance and on time. These features contribute to reduction in the costs of travelling or commuting.

Concerning personalization, Zeng et al. (2003) describe personalization as preparation of information. Personalization is defined as the extent to which the communication between consumers and sellers is shaped to the consumers' preferences, needs, and shopping habits. It ensures that consumers receive

Table 2. M-commerce feature-benefit model.

Feature	Benefit
Immediacy, Time, Ubiquity, Accessibility	Cost, Communication, Convenience
Localization	Convenience, Cost
Personalization	Convenience, Communication

the most relevant and appropriate message (Kim et al. 2001). Personalization not only enhances their perception of the seller (Xu 2003), but also decreases their searching costs–the effort to navigate wireless sites (Venkatesh and Ramesh 2006). Convenience and communication are benefits derived from this feature of m-commerce.

These features of m-commerce generate added value and benefits. Boadi et al. (2007) discussed the added-value and benefits of m-commerce as comprising cost savings (and improving operational efficiency), convenience (in work and productivity) and communication (improving information quality and relationships). The authors note that these benefits relate to the "3Cs used by Kalakota and Whinston (2002) to examine the direct impact of IT–m-commerce in this context–on business performance" (Boadi et al. 2007: 255). In relating features to the potential benefits to be accrued, this research proposes a feature-benefit model, demonstrated in Table 2.

Cost refers to the cost-reduction and operational efficiencies which a customer or firm may accrue from m-commerce adoption. Convenience refers to anytime and anywhere access to information at the point of need. Communication refers to improving information quality and relationships. Improving marketplace information has the potential of reducing the costs of searching for products and services, and the costs in timeliness of decisions related to negotiating transactional terms and fulfilling transactions (Kulviwat et al. 2004). Through personalization, immediacy and accessibility, m-commerce enhances communication, which contributes to deepening trust and the relationship between participants in a transaction.

In consideration of our current research endeavour the model presents the potential benefits to be obtained from m-commerce adoption. The next section examines how these benefits influence the micro-trading activities of market women and why market women engage in m-commerce activities.

M-commerce adoption and usage in micro-trading

What is the impact of mobiles phones on micro-trading activities?

Jagun et al. (2007) note in their study on mobile telephony and a micro-enterprise in Nigeria that, there are three main steps of trading that rely heavily on information (Norton 1992; Casson 1997). These steps of trading, outlined below, are the focal stages of trade which can be primarily influenced by mobile phones:

1. *Pre-trade*: information acquired prior to trading.
2. *During-trade*: information communicated during trading for items and forms of exchange, as part of negotiation.
3. *Post-trade*: information acquired after trading on agreements and/or maintaining relationships.

These steps of trading emphasize that information plays a key role in shaping and structuring commerce (Williamson 1975). The timeliness of information (speed); effort and resources to obtain trade information (cost); and risk associated with information uncertainties and asymmetries (informed decision-making) characterize the informational challenges associated with trade (Jagun et al. 2007). M-commerce changes the dynamics of how information is accessed or obtained in trade. In reference to our feature-benefit model (Table 2), its impact on micro-trading stems from the benefits obtained from the *cost*, *convenience* and *communication* of market information. This impact can be assessed as:

1. Enhancing *communication of information*–increasing speed and reducing cost.
2. Enhancing *trading processes*–informed decision-making, uncertainties and asymmetries are removed.
3. Reforming *structural processes*–the removal of intermediaries and deepening of transactional relationships.

Boadi et al. (2007) noted that m-commerce enabled fishermen in Ghana to 'virtually' negotiate the prices of fish with fishmongers before fishing trawlers reach the shoreline. The authors also note similar findings among Ghanaian farmers. For the market woman, 'virtual negotiations' may contribute to personalization of services for prospective customers and trading suppliers–which may include price differentiation, reservations and, perhaps, special deliveries to

customers. Arguably this may reduce the haggling over prices which characterizes traditional market environments. This potential impact of mobiles on trade is also partly influenced by the extent of usage of mobiles to communicate information in pre-trade, during-trade and post-trade activities. The feature-benefit model, discussed above, can be used to evaluate the potential added-value and benefits to be accrued from m-commerce adoption. The three trading activities (from an informational perspective) can be used to examine the extent of usage of mobile phones in trade. Based on this discussion, it can be proposed that:

> **Proposition 1**: The extent of integration of mobile phones into trading activities will influence the benefits obtained and impact realized by traders.

Why adopt and use m-commerce in micro-trading activities?

Conceptual/theoretical and empirical research (Wu and Wang 2005; Snowden and Spafford 2006; Bhatti 2007) investigating m-commerce adoption factors has predominately used the Technology Acceptance Model (TAM), among other technology adoption models like Diffusion of Innovation Theory (DOI) and Theory of Planned Behaviour (TPB). The Technology Acceptance Model presents an integrated model to explore the factors which influence consumer adoption and usage of m-commerce. TAM was formulated by Davis (1989) from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980).

TAM theorizes that the acceptance level of any technology is fundamentally affected by the user's perception of ease of use and usefulness (Ajzen and Fishbein 1980). TAM suggests that user adoption of a new technology is determined by the user's intention to use the technology, which in turn is determined by the user's beliefs about the technology. Extant research explains that TAM has proved that increasing the perceived ease of use (PEOU) of a technology will increase its perceived usefulness (PU), and translate into an increased behavioural intention (BI), thereby resulting in a higher margin of technology acceptance (Wu and Wang 2005). Therefore TAM could be useful in predicting user's intention to adopt new services and applications. In relating TAM to m-commerce adoption and usage, the different components of TAM are analysed as follows.

Perceived Usefulness. The Perceived Usefulness (PU) of a system is defined as the extent to which individuals believe that using the new technology will enhance their task performance (Davis 1989). There is extensive research on information systems (IS) that provides evidence of the significant effect of perceived usefulness on usage intention (e.g. Davis et al. 1989; Venkatesh and Morris 2000). In terms of m-commerce, mobile phones play a key role in enhancing interpersonal communication, which is also a key factor in establishing business relationships (Boadi et al. 2007). Therefore, as market women assess the role of mobile phones in social and business communication, their perceived usefulness of mobile phones will influence their intention to accept and adopt m-commerce (Bhatti 2007).

Based on the discussed literature, it can be proposed that:

> **Proposition 2:** Perceived usefulness will influence the intention of traders to adopt m-commerce.

Perceived Ease of Use. Perceived Ease of Use (PEOU) is an individual's assessment of the extent to which interaction with a specific technology is free of mental effort (Davis 1989). Davis (1989) argued that self-efficacy is one of the means by which PEOU influences behaviour. Applied to m-commerce, an easy-to-use mobile device removes the cognitive impediments to getting information through the device. Thus, the consumer develops a perception of having 'some' control over the mobile device. This perceived ease of use also influences the consumer's perceived usefulness of the mobile device. Based on the discussed literature, it can be proposed that:

> **Proposition 3:** PEOU, through PU, will have a positive effect on the intention of traders to adopt m-commerce.

However, other related research (Davis et al. 1989; Chau 1996) also argues that the influences of PEOU on PU diminish over time, as user proficiency with a technology increases (Kamel and Hassan 2003: 5). Kamel and Hassan (2003) therefore conclude that the TAM is appropriate in explaining the attitudes and usage intention of users during the early stages of adoption, but fails to consider the contextual influences such as culture and technology accessibility and affordability, which can affect the extent of usage in

post-adoption (Bhatti 2007; Boadi et al. 2007). In this paper we will explore three contextual factors–accessibility, affordability, and knowledge of the adopter–which influence m-commerce adoption and usage (Tarasewich et al. 2002; Milne 2000; Milne 2006).

Accessibility and Affordability. Affordability and accessibility tend to be intertwined. Accessibility means that service is accessible to all people (Milne 2000). Extant research distinguishes six types of access: physical, cognitive, affective, economic, social and political (McCreadie and Rice 1999). Physical accessibility has to do with the question of whether or not a medium is physically accessible. Cognitive accessibility has to do with understanding how systems work (technically) and how to master new technologies. Affective accessibility relates to attitudes and motivation with regard to the use of systems, such as confidence, efficacy, and trust. Economic accessibility relates to benefits and costs, while social accessibility relates to cultural norms, and political accessibility to power and knowledge gaps.

Galperin (2005) states that modern technology is capable of providing access anywhere, but the key challenge is paying for it. Affordability is only fully achieved by reducing *barriers* which prevent people from owning a mobile phone or using a shared-access mobile phone and reducing *inhibitors* which discourage people from making as many calls as they need to (Milne 2006). The barrier effect is partly related to physical and economic access and the inhibitor effect is partly related to income levels and mobile tariff price levels. Reports on the diffusion of mobile phones in developing regions like Africa provide some evidence of the reduction of the barrier effect (Sey 2009). However, the actual number of *active* mobile phone users is questionable, especially in developing regions where income levels are low and mobile tariff price levels are high (Heeks 2009). For example, a study observed that poor Nigerian households spend up to 8 percent of their income on telephone services (Intelecon 2005). Another study showed levels in the range of 10–14 percent on telephone expenditure among poor households in Tanzania (Souter 2005). These studies suggest that poor households in developing countries have relatively higher telephone expenditure levels, hence making mobile tariff price levels affordable is a prerequisite to the potential benefits to be accrued from usage. Based on the discussed literature, it can be proposed that:

Proposition 4: The readiness of the external mobile environment in terms of affordability will influence the mobile adoption and the extent of usage by traders.

Proposition 5: The readiness of the external mobile environment in terms of accessibility will influence the mobile adoption and the extent of usage by traders.

Knowledge of the Adopter. The knowledge of the adopter may be compared to the perceived ease of use (PEOU) as an attribute of self-efficacy. PEOU based on the knowledge of an adopter may arise due to the complexities of devices that call for necessary technical know-how for their successful adoption (Nambisan and Wang 2000). This implies that mobile systems need to have easy-to-use navigation, and fit into the daily routine of users (Kleijnen et al. 2004). Buellingen and Woerter (2002) highlight user-friendliness as a critical success factor for the use of mobile services. Hence, being able to match the complexity of mobiles and related services to a wider range of knowledge levels becomes a prerequisite to increasing adoption and usage. Based on the discussed literature, it can be proposed that:

Proposition 6: In relation to perceived usefulness and perceived ease of use, the knowledge of a trader, as an adopter, will influence the actual usage of mobile services.

The above propositions are captured in a conceptual model for m-commerce adoption and usage, illustrated in Figure 1. This conceptual model is adopted as the theoretical framework for this research.

The model proposes that the behavioural intention to adopt m-commerce would be influenced by PU and PEOU, and the extent of usage of m-commerce would be influenced by behavioural intention (BI) and PU. The PU of m-commerce is conceptualized in terms of the 3Cs framework–cost, convenience and communication. PEOU is conceptualized as the complexity or ease of use of the mobile phones and related services to the user. BI is conceptualized as reasons (or drivers) for adoption and is influenced by PEOU and PU. The extent of usage is conceptualized as the use of mobile phones to support the three steps in trading.

However, these factors, PEOU, PU and BI tend not to be enough in explaining other contextual factors which mediate m-commerce adoption. Hence, it is
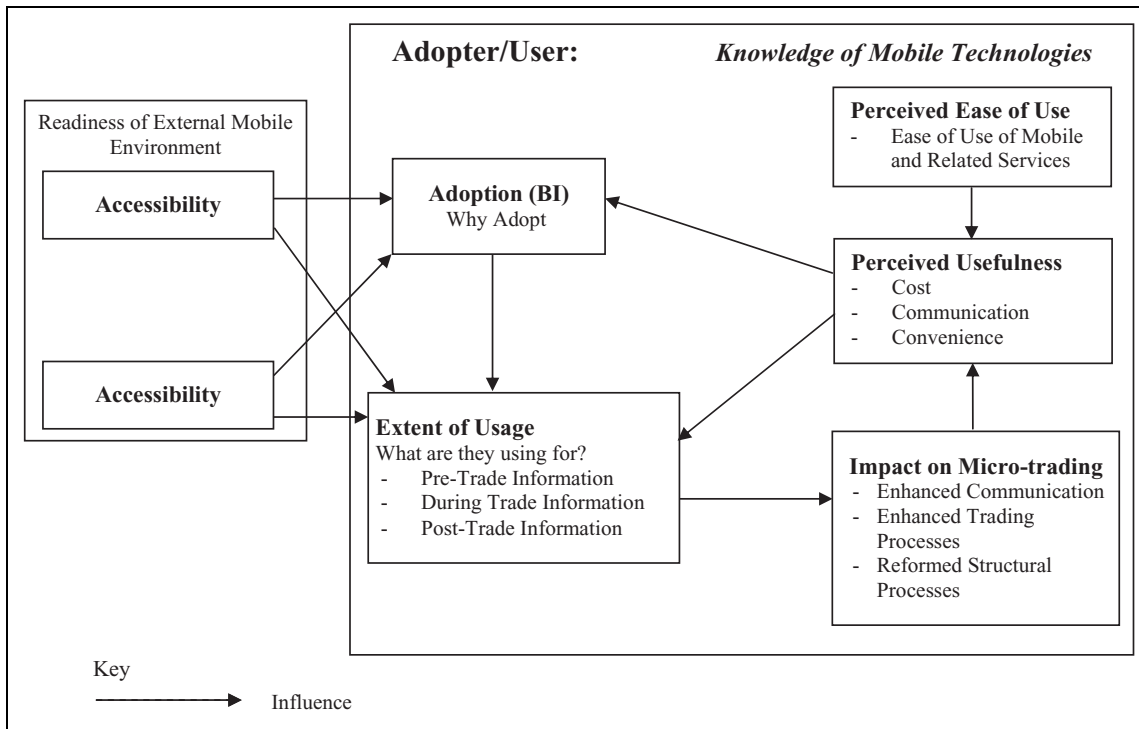
Figure 1. Conceptual model for m-commerce adoption and usage by traders.

also proposed that the affordability and accessibility of mobile phones and knowledge of the adopter would mediate m-commerce adoption. The adoption and use of mobile phones will lead to three effects on micro-trading activities: enhanced communication, enhanced trading processes, and reformed structural processes (Jagun et al. 2007). The impact on micro-trading activities will enhance perceived usefulness and reinforce the behavioural intention to adopt and use mobile phones in trade.

The research questions to guide the data collection and analytical investigation of these propositions among m-commerce adoption and usage by Nigerian market women are:

1. Why do Nigerian market women adopt m-commerce or use mobile phones in trading activities? This question will enable us to investigate propositions 2, 3 and 6:
   - Perceived usefulness will influence the intention of traders to adopt m-commerce.
   - PEOU, through PU, will have a positive effect on the intention of traders to adopt m-commerce.
   - In relation to PU and PEOU, the knowledge of a trader, as an adopter, will influence the usage of mobile services.

2. What value/benefits are Nigerian market women (traders) obtaining from m-commerce adoption? What has been the impact of mobile phones on trading activities of the market women? These questions will enable us to investigate proposition 1:
   - The extent of integration of mobile into trading activities will influence the benefits obtained and impact realized by traders.

3. What challenges do they face in accessing and using mobiles in trading activities? This question will enable us to investigate propositions 4 and 5:

   - The readiness of the external mobile environment in terms of affordability will influence the mobile adoption and the extent of usage by traders.
   - The readiness of the external mobile environment in terms of accessibility will influence the mobile adoption and the extent of usage by traders.

The framework and these questions would guide the data collection and analysis processes.

Research methods

The underpinning research question is *"how do mobile phones influence the micro-trading activities*

of market women in Nigeria''. An exploratory study, as in this research, is particularly useful approach when a researcher wishes to improve the understanding of a phenomenon (Saunders et al. 2000) or assess a phenomenon in a new light (Robson 1993). This can be aided by the use of case study as a research method. Case studies are well-suited to new research areas or research areas for which existing theory seems inadequate (Eisenhardt 1989) and investigators have less control (Yin 1994). As earlier explained, m-commerce in developing countries is a developing research area and a more theoretically comprehensive approach is needed to establish a better understanding of the multi-stranded effects of mobile phones adoption, use and impact on adopters. This research adopts case study as the research method.

Case study selection

As posited by case study researchers (Walsham 1993; Yin 2003), there is no universally acceptable number of cases for case study research. The research could be based on a single case or many cases. This study is based on case study of two market women in Nigeria. The external validity of case studies is enhanced by the strategic selection of cases rather than their statistical selection (De Vaus 2001: 238). Walsham adds that the validity of the case study has more to do with the "plausibility and cogency of the logical reasoning" (Walsham 1993:15) and less with the number of cases.

The strategic selection of these two case studies entailed being somewhat knowledgeable about the characteristics of each case before the main case study began. Data collection was scheduled in two stages, consisting of a pilot study, which took place from May 2008, and a main study which took place from June to July 2008. The objective of the pilot study was, first, to explore the relevance of research questions and propositions and ensure that they were adequate to collect data which would suffice our research objectives. Secondly, we also sought to develop an understanding of the structure of markets in Nigeria, and screen and select potential case studies for the main study.

A pilot study was conducted with 15 market women selected from the Wuse and Gaza markets, which are amongst the largest markets in Abuja, the capital city of Nigeria. The marketplace system in Nigeria evolved out of periodic agricultural markets and a long history of trans-Saharan and trans-

Atlantic trade (Dupire 1962). Since Abuja became the capital city of Nigeria in 1991, commercial activities in the erstwhile quiet northern territory have increased. Markets in Abuja are not only a focal point attracting trade migrants originating from Mali or Niger, they also serve as a hub for agricultural and farm produce from most of northern Nigeria. The market activities in Abuja tend to resonate to other states in Nigeria and other African countries linked to the state by trade. Considering other states, we envisioned that the impact of mobile phones in the micro-trading activities in Abuja would therefore have potentially broader impacts.

Four categories of traders were identified according to their type and scale of activities: (1) wholesalers, who are sometimes itinerant traders who travel to buy foodstuffs–potatoes, tomatoes and onions–in rural areas; (2) wholesale retailers, who sell foodstuffs in bulk to (3) retailers, who sell bags of foodstuffs directly to customers, or sell in smaller quantities to (4) petty traders and street hawkers.

Though the pilot study did not change the initial research questions and propositions, it enabled the researchers to select cases which could explore the research questions and propositions. Two market women–a potato trader and a tomato trader–were selected from the 15 women interviewed in the pilot study. The two market women represent wholesalers that had developed a network which spanned the first two categories of traders. The traders had engaged in micro-trading activities for more than 5 years and had owned and used mobiles in their trading activities for a minimum of 2 years. These traders had adopted some form of m-commerce which sufficed the analytical investigation in this research. The findings of the pilot study are presented in Appendix A.

Data collection and analysis

Data was obtained through semi-structured interviews, observation and documentary accounts–including industry reports and documents. To document the mobile-trading activities of these women, six interviews were done with the potato trader and eight interviews with the tomato trader. These interviews were conducted with the traders, their customers and trading suppliers. The four categories of questions on adoption, usage, challenges, and impact of mobiles were asked. Using the questions as a guide, the traders were allowed to openly discuss
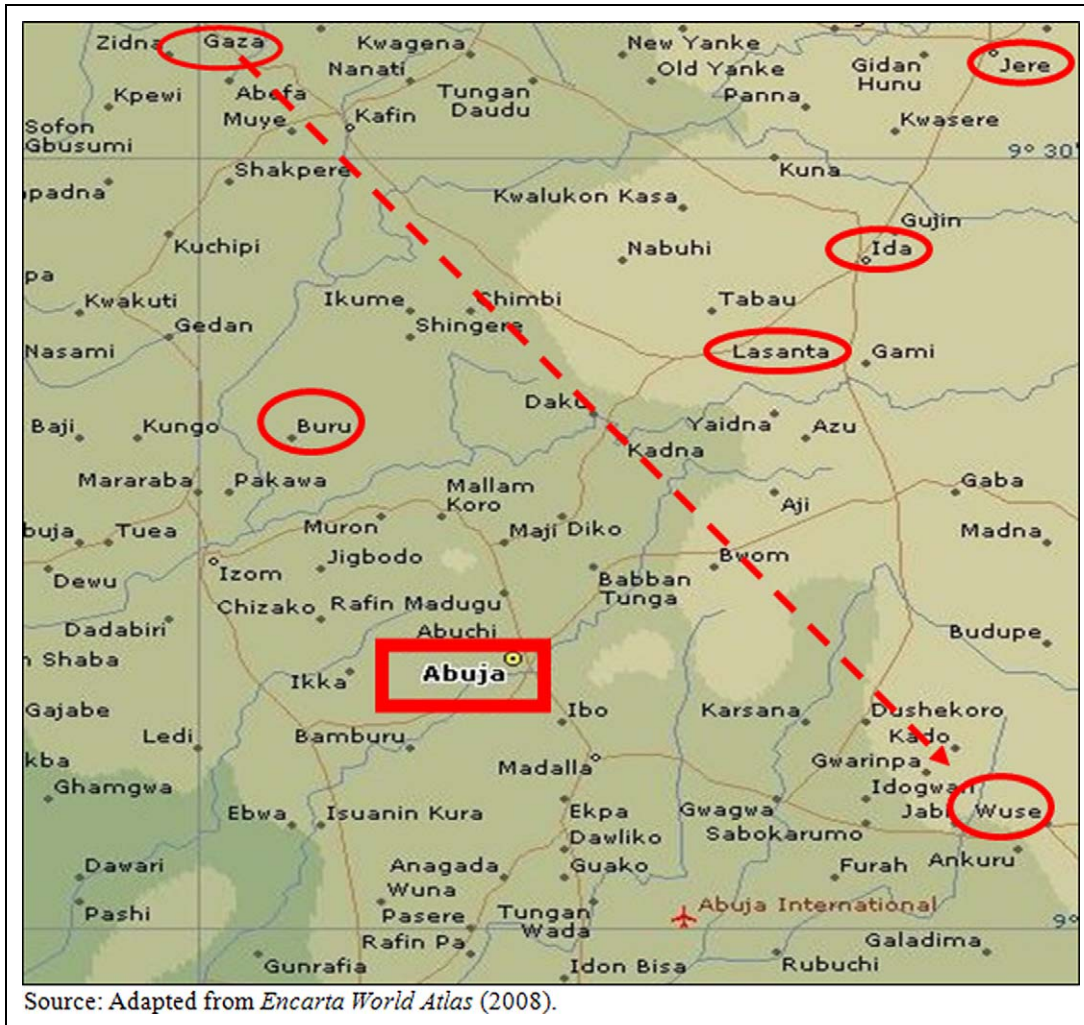
Exhibit 1. Map of Abuja, Nigeria.
Source: Adapted from *Encarta World Atlas* (2008).

their experiences in m-commerce adoption. The traders were also observed conducting transactions through their mobile phones.

To develop a contextual understanding of services provided by mobile network operators and associated mobile phone usage costs, two marketing personnel from the Glo mobile network operator and two retailers of mobile services for the three major mobile networks (MTN, Glo Mobile and Celtel) were interviewed.

Interviews were transcribed and discussed with interview participants to ascertain discrepancies and fill information gaps. The mode of analysing the case study was by use of pattern-matching, as explained by Yin (1994). This was done by seeking findings which support, or if not, further explain the research propositions.

Case study findings

Case A: Potato trader

Hajiya Mairo (hereafter referred to as Hajiya) is a potato wholesaler at the Wuse market, Abuja. She purchased a mobile phone, Nokia 3310, in 2005. Her choice of mobile phone was primarily because of affordability (US $35 for a new handset) and its ease of use. She has a pre-paid price plan. Though her knowledge on using other mobile functions is limited, she finds her mobile phone relatively easy to use and can send SMS in her local language. Hajiya works with Amina, an itinerant potato trader, who travels about 400km from Wuse to the neighbouring rural areas to buy potatoes from farmers. Amina frequently calls Hajiya in Wuse using a call centre to inform her about the local supply and producer prices. Hajiya

Photo Source: News Agency of Nigeria (taken 16/1/12)

Exhibit 2. Wuse Market, Abuja, Nigeria.
Photo Source: News Agency of Nigeria (taken 16/1/12).

advises on the price and quantity by assessing the current demand on the market. Communication is strained and quite often not timely, since telephone booths or commercial communication kiosks are few in the rural areas. Due to the limited network coverage in potato farming areas, Hajiya does not consider the substantial investment of equipping Amina with a mobile phone worthwhile. Hajiya comments that

> "The costs of travelling from village to village could be saved if there was better network coverage in those villages. Hence, the farmers might also have their phones and I would be able to communicate directly. Therefore, there will be less or no journeys to make".

There are also questions on appropriate usage. Hajiya suspects that Amina would use the mobile phone for non-business activities or her personal engagements. Concerning her trading with her customers, Hajiya states that:

> "I exchange information between myself and my customers faster as they call to enquire when my truck of potatoes will be arriving and how much of it they want. This was not the case before I owned a mobile phone".

Two trading partners and three customers of Hajiya interviewed in the research owned mobile phones which they used to communicate with her directly without intermediaries. By receiving information faster and more frequently, Hajiya is able to calculate demand, supply, and prices more accurately, which reduces the risk of losing money and improves her profit potential.

Case B: Tomato trader

Binta is a wholesale trader in Gaza market. She co-manages a family tomato farm with her husband in Jere, which is 350 km from Abuja Central. In 2003, Jere obtained GSM coverage and it immediately became worthwhile to acquire a mobile phone. Binta, her husband, and some of her employees purchased mobile phones. Prior to mobile adoption, telephone booths or commercial communication kiosks were used for communication between Binta and employees. According to Binta, the most important factor in coordinating the value-chain in tomato production is the timing of harvesting, packing, and transportation. The objective is to achieve an ultimate balance between supply and demand. Binta states that

" ... Coordination of the business has become much easier. I can now quickly call my husband and say that the market in Abuja is good so he should send tomatoes at once. Or I ask him to hold back if there is a glut."

Binta is on the post-paid price plan as she considers it being much cheaper for her total monthly calls and text messages. Her husband and employees subscribe to a pre-paid price plan. She uses a Nokia 3315 because of its ease of operation and durability. She also finds it user-friendly for text messaging. Concerning her customers, she explains that traders become more accessible to customers provided both parties have access to mobile phones. Binta and her customers use mobile banking services to confirm payments. One of Binta's customers states that

"I used to travel to the market with large sums of money but now with my mobile phone, I call my bank to transfer some money to the 'farm account'. When the transfer is confirmed, I call Binta and I get my tomatoes".

Hence, since calls substitute for most of the journeys embarked on by traders and customers, there are benefits related to fewer risks of accidents and armed robbery attacks.

Discussion of case findings

This section discusses the case studies to understand how mobile phones are used in micro-trading activities; the benefits and impact; and the associated challenges.

Mobile phones and trading activities

To begin our analysis, we first ask: why do Nigerian market women adopt m-commerce or use mobile phones in micro-trading activities? Findings from the pilot study suggest that mobile phones are used to communicate and exchange information which relate to pre-trade, during-trade and post-trade activities (see Appendix A). These findings are not far from what is observed in the case studies discussed above. In Case A, Hajiya uses mobile phones to exchange information on supply, demand and prices with Amina and customers. In Case B, Binta uses mobile phones to coordinate activities between the farm in Jere and market in Abuja. She also uses the mobile banking services to confirm payments. In using mobile phones both have reformed their structural

processes in managing supply and demand with more timely and relevant information and further enhanced their trading processes to be quicker and less costly.

As earlier argued, trading is primarily about information; hence, participants engaged in trade transactions seek for innovative ways to minimize costs in acquiring, exchanging and communicating information (Williamson 1985). In both case studies, the use of telephone booths or commercial communication kiosks formulated the pre-knowledge and experience of potential benefits from telecommunication devices and the impetus to move to mobile devices when mobile services became accessible and affordable. The motivations for adoption of mobile phones in business were primarily focused on obtaining perceived benefits. These perceived benefits, coupled with other social and familial uses (as in Case B), created the perception of usefulness of mobile phones for the traders. This characteristic of these traders tends to be suggestive of our second proposition that:

Perceived usefulness may influence the intention of traders to adopt m-commerce.

On the other hand, TAM argues that, at the early stage of adoption, PU is influenced by perceived ease of use of the technology, which leads to intention to use. Findings from our case study suggest that the traders purchased mobile phones which are relatively simple in functionality and easy to use. Sixty percent use low-cost Nokia mobile phones including Nokia 1100, 3310 and 3315. The choice of low-cost and easy-to-use mobile phones is consistent with the findings of previous research in Ghana (Boadi et al. 2007). The primary mobile function used by the 15 traders interviewed in the pilot study was voice calls (see Appendix A). Text messaging, phone contacts book, and calculators functionalities were used by five traders (33 percent) and mobile banking services were used by three traders (20 per cent). It was observed that the traders who used mobile phones beyond voice calls had either completed a primary level of education (four traders, 27 per cent) or secondary level of education (one trader, 7 per cent). These traders concurred that their educational background enhanced the literacy of the mobile functions. Hajiya mentioned her ability to send text messages in her local language and Binta discussed how the ease of use of the Nokia 3315 and her post-paid price plan encouraged her to use text messaging frequently. The findings are suggestive that the ability to integrate

functions beyond voice calls in trading activities is arguably a function of some level of education and the perceived ease of use of the mobile phones used by the trader. Heres et al. (2004) point to the design of technology, usability and skills as technological and cognitive barriers which influence mobile adoption. These barriers have a negative effect on the actual usage or extent of usage of mobile services. For example, the traders (33 per cent) who used the text messaging functionality could readily take advantage of promotions, surveys and alerts sent through text messages by mobile network operators. Three of these traders often shared such information with their less literate trading partners or other traders in the market association.

In effect, the technological adeptness of the trader in relation to mobile phones partly influences the extent of use of the features and services provided through the mobile phone and further influences the extent of benefits realized. These interrelationships between technology adoption and use and owner/adopter characteristics are consistent with findings from previous research (Donner 2007). From the above discussion, there is evidence that is suggestive of the fifth proposition:

> In relation to PU and PEOU, the knowledge of a trader, as an adopter, can influence the actual use of mobile services.

In reference to our third research proposition, we do identify traders opting for mobile phones, which are not only easy to use but comparably less expensive. This is evident in the case of Binta and Hajiya. Hence, the traders in this study tend to adopt the path of least cost of adoption–in terms of the cost of acquisition and the cost of usability. Cognitive and economic accessibility are argued to be influenced both by the efforts of consumers and by the extent to which mobile phone manufacturers manage to keep the effort required of users at a minimum (Bouwman et al. 1996). The findings in this study suggest the part played by traders as consumers; they adopt measures to reduce their economic and cognitive accessibility barriers in acquiring and using mobile phones (McCreadie and Rice 1999). Hence, we find evidence to suggest that:

> PEOU, through PU, may have a positive effect on the intention of traders to adopt m-commerce during the pre-adoption stage.

We may also argue that in micro-trading activities, traders take the path of least cost of adoption of mobile phones in terms of acquisition and usability.

Benefits obtained by traders

The benefits obtained by the traders primarily have operational and relational effects on their trading activities–enhanced communication, enhanced trading processes, and *some* reformed structural processes. To analyse the benefits, we draw on the feature-benefit model (Table 2). The basic features of immediacy, ubiquity and personalization contributed benefits which enhanced the businesses of both market women. These features enabled mobile devices to redefine the 'place' factor and reduce the need to have 'face-to-face' contact in trade transactions. Hajiya is able to monitor delivery times of goods and plan for contingencies. Binta intimated on the reduced cost of coordinating operations and reduced risk in taking long journeys. These remote or 'virtual' negotiations and management are facilitated by the ubiquity and immediacy features of mobile services. The features enhance the timeliness in communication and decision-making to create better control of supply, demand and prices and open opportunities for deepening relationships and personalized services.

However, while there is evidence of enhanced communication and trading processes for the traders, we join Heeks and Jagun (2007) to ask if there are any significant changes to the supply chain in this form of trade? In Case A, there is no evidence of a change in the structure of the supply chain. There is evidence of enhanced communication and trading processes from the use of the call centre to call Hajiya's mobile phone. Physical access challenges–poor network coverage–have primarily stalled the intention to use mobile phones and hence the potential benefits realized are comparably less. This demonstrates how the readiness of the environment–physical accessibility–influences the adoption and extent of usage of mobile phones. In Case B, there were comparable issues of physical access–no network coverage–prior to mobile adoption. After the physical accessibility challenge was addressed, we identified that mobile banking services have introduced a new 'virtual' participant–the bank or 'farm account'–into during-trade and post-trade stages of transactions. The pilot study findings (Appendix A) suggest that two traders, other than Binta, use mobile banking services. These traders are

Table 3. Monthly income ranges among selected trader groups.

∫	Approximate Monthly income USD	Affordability One Recharge card per week/Percentage of income in a month	
		$4	$10
Rice retailer	115	14%	35%
Rice wholesaler	385	4%	10%
Potato retailer	77	20%	52%
Potato wholesaler (Case A)	170	9%	24%
Tomatoes retailer	115	14%	35%
Tomatoes wholesaler (Case B)	192	8%	21%

using mobile phones to create something new to their structural processes–access to services which were not previously available or readily accessible. This introduction of 'virtual' participants in the form of mobile banking services as a key component in the supply chain–confirming the fulfilments of transactional terms–has been noted in a previous study on mobile phone usage by fishermen and farmers in Ghana (Boadi et al. 2007). Heeks and Jagun (2007) characterize such a change as a transformational effect on the traditional commerce processes. We may therefore argue that there is some evidence of reformed structural processes which has a transformational effect on the supply chain.

However, on the level of the trader as an individual, we ask further, what are the implications of the benefits to development? Studies show that access to telephone services constitutes an important tool for the improvement of living standards (Cronin et al. 1993). Aminuzzaman et al. (2003) suggest assessing the impact of mobile phones on the poor from a more multi-stranded perspective. The authors envision the mobile phone as a 'ripple-effect technology' whose impact spreads across many aspects of the life of individuals and their communities. A multi-stranded impact includes:

- Economically–income, decision-making power, involvement and control over economic transactions; and
- Socially–widening network of beneficiaries and gender roles in society.

Economic empowerment is evident in both case studies. This was reiterated by the head of the market women's association in Wuse market during the pilot study. The findings suggest the traders improved their income from cost reduction, better management of supply, and increased decision-making and control in transactions. We may argue that *in micro-trading activities, enhancing communication and trading processes through mobile phones directly or indirectly improves revenue and enhances decision making and control, and thereby economically empowers traders.*

On the other hand, the findings also suggest exploring the influence that mobile phones have on the traditional market transactions in cultures, like that of Nigeria, that depend on rich interpersonal communication or face-to-face interaction in transactions (Hofstede 1985). Face-to-face interaction is preferred in these cultures because of the greater intensity of socializing and more verbal communication (Bajaj and Leonard 2004). A number of authors have posed similar questions on the uptake of the e-commerce in countries where customers are used to physically touching and 'seeing' goods before they are purchased (Harrison-Walker 2002; Okoli and Mbarika 2003). Mobile phones, as a communication medium, facilitate more verbal communication which can create new or reinforce existing social and business networks. The features of mobile phones enable mobile users to substitute enhanced communication and accessibility over distance for 'face-to-face' interaction in social-business relationships including trade transactions. Thus, the ability of mobile functions to interface with social-business relationships makes mobile devices a more suitable alternative medium for communication where the 'culturally-preferred' face-to-face interaction is constrained by distance.

Challenges to m-commerce adoption and usage by traders

The extent of benefits obtained, especially costs benefits, is mediated by accessibility to mobile phones by both parties in the transaction. This is evident in Case

Table 4. Demographic statistics of the 15 market women interviewed.

Age of market women	23–50 years
Age of business	3–15 years
Nature of business	Selling of food stuffs
Number of suppliers	2–5
Motivation for getting mobile phone	Communication gaps and delay in pre-trade negotiation
	Loss of orders and travelling risks
	Unnecessary expenses/overhead costs
Functionalities used	Voice calls (15 adopters)
	Text messaging (5 literate adopters)
	Mobile banking services (3 literate adopters)
How mobile phone has helped	Access to business partners and customers
	Timeliness in order deliveries and increase in revenue
	M-banking services
Problems associated with mobile phones usage	Network failure and coverage
	Cost of call tariff and theft of phones
Types of phones used	Nokia: 9 users (cheaper and easy to use) LG: 1 user
	Samsung: 4 users Other: 2 users
	Sony Ericsson: 1 user
Number of phones owned by Market woman	1 mobile phone on average, though 2 market women owned 2 mobile phones each
Most used network	MTN because of wider network coverage
Monthly phone bills	$40–$120 (Average)

A: transportation costs could be cut down if Amina had access to a mobile phone. Hence, while Hajiya has a positive attitude towards mobile adoption and a good perception of its usefulness, issues concerning appropriate usage and poor network coverage in rural areas have discouraged Hajiya from purchasing a mobile phone for Amina. These issues relate to physical access and perceptions of usage behaviour. These contextual factors influence access and use and thereby affect the extent of benefits obtained.

Affordability was found to be a major challenge to the market women since their revenue potential was quite inconsistent. This influenced economic access to mobile airtime and other accessories, and thus increased the inhibitor effects. Recharge cards for mobile airtime range from $4.00 to $10.00, which can be easily consumed depending on the number of calls made in a day. If each trader buys one $10 recharge card per week, then from Table 3, first, mobile phone usage is more affordable for wholesalers as compared to retailers. Secondly, in order to make calls, retailers would be spending between 14 to 52 per cent of their monthly income on recharge cards. The case of Binta and her employees illustrates this challenge of economic access. Binta, as a wholesaler and a high income earner in trader groups, subscribes to a post-paid plan which she considers to be comparably less

expensive, while employees who are comparably low income earners subscribe to a pre-paid plan.

In effect, since economic access influences inhibitor effects (for example, the frequency of use or making calls), the benefits obtained may be comparably less. It presupposes that the extent of benefits obtained tends to be partly influenced by the extent of mobile access and usage by traders and their trading partners in their value chain. Traders who are able to integrate or use mobile phones into all the trading activities in their trading value chain–pre-, during- and post-transactions–are likely to realize more benefits and impact. We find evidence to suggest that:

> The readiness of the external mobile environment–affordability and accessibility–may influence the mobile adoption and the extent of usage by traders.

In summary, this research found evidence that tends to support all the propositions posited in the research. There are also three new lessons which provide a better understanding of the dynamics between mobile phones and micro-trading activities of Nigerian market women. The new lessons are:

1. In micro-trading activities, traders take the path of least cost of adoption of mobile phones in terms of acquisition and usability.

2. In micro-trading activities, the extent of benefits obtained tends to be partly influenced by the extent of mobile access and usage by traders and their trading partners in their value chain.

3. In micro-trading activities, enhancing communication and trading processes through mobile phones directly or indirectly improves revenue and enhances decision making and control, and thereby economically empower traders.

Conclusion

In reference to the research gaps highlighted in the introduction of the paper, the study has generated valuable insights and lessons for research and practice. The study shows that, regarding micro-trading, traders use mobile phones for pre-, during- and post-trade activities. This form of usage leads to enhanced communication and enhanced trading processes. The benefits obtained by the trader tend to be partly influenced by the extent of mobile phone usage by the trader and other participants–customers and trading partners–in the value chain. Limited accessibility, be it physical, economic or cognitive (knowledge of adopter), influences the level of usage and extent of benefits obtained.

In using TAM to understand the factors which influence adoption, our findings tend not to be far from that of previous research on technology adoption (Kamel and Hassan 2003; Bhatti 2007). There is evidence to suggest the effect of PU and PEOU on the intention to adopt m-commerce. However, we learn that traders take the path of least cost of adoption of mobile phones in terms of cost of acquisition and usability. Wu and Wang (2005) considered the adoption cost as essential in m-commerce settings and also as having a significant influence on perceived usefulness and ease of use. Thus, the development of strategies of mobile network operators should consider the cost of acquisition and usability for those at the 'bottom of the pyramid' which also represents a significant market size (Duncombe and Boateng 2009). In terms of actual usage, the knowledge of the trader plays a critical role in determining the type of mobile functionality used. Some traders, though few in number, innovatively use mobile banking services as a 'virtual participant' confirming payments and thereby reform their structural processes in transactions. This innovative use has a transformational effect on the existing supply chain. At the level of the trader as an individual, the effects of mobile phones on trading activities contribute to the economic empowerment of the market woman. An increase in the knowledge and skill of using mobile functions and services has a higher potential of increasing economic empowerment for the market woman.

In effect, concerning implications for practice and policy, the innovative use of mobile services in trading activities should be encouraged. Sen (1999: 75) argues from the human-centred development perspective that the concept of development should go beyond providing commodities to considering the 'capability to function' –what a person can do with the commodities they come to possess or control. We recommend that the current 'mobiles for development' movement should consider campaigns targeted at educating traders on mobile functions and services– beyond voice calls and text messaging–which may enhance their trading activities. For example, educating traders and farmers to use short messaging services (SMS) to access the West African agriculture market portal, www.tradenet.biz, could contribute to extending their market reach. In the context of gender development in Nigeria, measures to educate or equip women with skills and resources that will lead into economic empowerment have been emphasized by previous research (Nkamnebe 2008). This call for action will require the combined efforts of policy makers, practitioners and researchers. In terms of research, the work of Parikh and Lazowska (2006), focusing on the design of mobile architecture for information delivery in rural India, has taken a step in doing so. However, there is room for more research.

This study was limited to two case studies of market women in Nigeria. Future research may focus on a quantitative approach using survey methods to test how the research propositions and lessons are reflected in a larger population of traders. Researchers may also investigate the actual usage patterns of adopters in terms of which mobile functions and services are used and how usage patterns relate with different micro-economic activities or professions. This may include taxi services in transportation, and carpenters and potters in manufacturing. The research propositions and lessons developed in this study may guide the future research suggested. More research is important to effectively harness the potential of this rapidly diffusing technology for development.

Appendix A

Key Findings from Pilot Study

Table 4 shows a summary of findings from the 15 market women who were interviewed in the pilot study. The mobile usage patterns differ by the trading stage: 13 market women (90 percent) claimed to use mobile phones in pre-trade activities; 11 market women (75 percent) used them in post-trade activities; and 3 market women (20 percent) used them in during-trade activities. Pre-trade activities include ordering goods directly from farmers or through itinerant traders, and informing customers on the availability of goods. During-trade activities include calculating sales and purchases; use of mobile banking to confirm payments; and calling employees in other marketplaces to monitor the demand for goods and pricing strategies of competitors. Post-trade activities include contacting customers to follow-up on services provided and address inquiries and complaints. Mobile phones tend to be used primarily to communicate and exchange information which relates to pre-and post-trade activities. The factors which affect usage include literacy (knowledge of the adopter), operational costs, poor network coverage and theft of mobile phones in the market.

Concerning the benefits obtained, the market women, especially the head of the market women's association in Wuse market, reiterated that mobile adoption is an added advantage to the growth of their enterprises and is a way of empowering women and making communication easier. Access to their customers also enhances decision-making and better management of inventory and supply. The convenience in communication and the reduced searching costs and risks from embarking on long journeys contributed to the adoption of mobile phones for business.

Acknowledgment

References

Ajzen I and Fishbein M (1980) *Understanding attitudes and predicting social behaviour*. Prentice Hall, Englewood Cliffs, NJ.

Aminuzzaman S, Baldersheim H and Jamil I (2003) Talking back: empowerment and mobile phones in rural Bangladesh: a study of the village pay phone of the Grameen Bank. *Contemporary South Asia* 12(3): 327–348.

Bajaj A and Leonard LNK (2004) The CPT framework: understanding the roles of culture, policy and technology in promoting e-commerce readiness. *Problems and Perspectives in Management* (3): 242–252.

Barnes SJ (2002) The mobile commerce value chain: analysis and future developments. *Information Management* 22(2): 91–108.

Bertrand V, Caplan A, Chab F, Fernandez-Moran E and Letelier C (2001) *M-commerce–who will reap the profits?* Kellogg Tech Venture Anthology.

Bhatti T (2007) Exploring factors influencing the adoption of mobile commerce. *Journal of Internet Banking and Commerce* 12(3): 1–13.

Boadi RA, Boateng R, Hinson R and Opoku RA (2007) Preliminary insights into m-commerce adoption in Ghana. *Information Development* 23(4): 253–265.

Boateng R (2011). Mobile phones and micro-trading activities–conceptualizing the link. *Info: The Journal for Policy, Regulation and Strategy* 13(5): 48–62.

Bouwman H, Nouwens J, Slootman A and Baaijens J (1996) *Een schat aan informatie: een onderzoek naar de toegankelijkheid van elektronische overheidsinformatie*. Rathenau Instituut, Den Haag.

Buellingen F and Woerter M (2002) Development perspectives, firm strategies and applications in mobile commerce. *Journal of Business Research 5830*.

Casson M (1997) *Information and organisation: a new perspective on the theory of the firm*. Oxford University Press, New York, NY.

Charles AK, Uyinomen EO, Ibukun FT and Ayodele AA (2007) M-commerce implementation in Nigeria: trends and issues. *Journal of Internet Banking and Commerce* 12(2): 1–15.

Chau PYK (1996) An empirical assessment of a modified Technology Acceptance Model. *Journal of Management Information Systems* 13(2): 185–204.

Cronin FJ, Colleran EK, Parker EB and Gold MA (1993) Telecommunications infrastructure investment and economic development. *Telecommunications Policy* 17(6): 415–430.

Davis FD (1989) Perceived Usefulness, Perceived Ease of Use and User Acceptance of information technology. *MIS Quarterly* 13(3): 319–341.

Davis FD, Bagozzi RP and Warshaw PR (1989) User acceptance of computer technology: A comparison of two theoretical models. *Management Science* 35(8): 982–1003.

De Vaus D (2001) *Research design in social research*. Sage Publications, London.

Donner J (2007) M-banking and m-payments services in the developing world: complements or substitutes for

trust and social capital? Paper presented at the *Precon-ference on Mobile Communication at the 57th Annual Conference of the International Communication Associ-ation*, San Francisco, CA.

Duncombe R and Boateng R (2009) Mobile phones and financial services in developing countries: a review of concepts, methods, issues, evidence and future research directions. *Third World Quarterly* 30(7): 1237–1258.

Dupire M (1962) Trade and markets in the economy of the nomadic Fulani of Niger (Bororo). In: Bohanan P and Dalton G (eds) *Markets in Africa*. Northwestern University Press, Evanston, USA.

Eisenhardt KM (1989) Building theories from case study research. *Academy of Management Review* 14(4): 532–550.

Frolick M and Chen L (2004) Assessing m-commerce opportunities. *Information Systems Management* 21(2): 53–61.

Galperin H (2005) *Telecommunications reforms and the poor: the case of Argentina*. Annenberg School for Communication, University of Southern California.

Goodman J (2005) Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania. From: Africa: The impact of mobile phones. *Vodaphone Policy Paper Series* 3: March 2005. [Online] http://www.vodaphone.com/ [Accessed 04/04/2008].

Harrison-Walker LJ (2002) If you build it, will they come? Barriers to international e-marketing. *Journal of Marketing Theory and Practice* 10(2): 12–21.

Heeks R (2009) Beyond subscriptions: actual ownership, use and non-use of mobiles in developing countries *ICTs for Development*. Available at: http://ict4dblog.word press.com/ [Accessed November 17, 2009].

Heeks R and Jagun A (2007) Mobile phones and develop-ment: the future in new hands? *Id21 insights* 69.

Heres J, Mante-Meijer E, and Pires D (2004) Factors influ-encing the adoption of broadband mobile Internet. In: Mante-Meijer E and Klamer L. (eds.) *ICT capabilities in action: what people do*. Cost Action 269, Brussels. EUR 21637.

Hofstede G (1985) The interaction between national and organizational value systems. *Journal of Management Studies* 22(4): 347–357.

Intelecon with eShekels (2005) Nigerian demand study for the NCC. Part of a World Bank funded contract. Presentation given to Nigeria Telecom Summit on 7 November.

International Telecommunication Union (2007) *Africa, ICT indicators, 2007*. [Online] Available: from http://www.itu.int/ITU-D/ict/statistics/at_glance/af_ictindicat ors_2007.html [Accessed: 5th July 2009].

International Telecommunication Union (2011) *ICT statis-tics database*. Geneva: ITU. [Online] Available at: http://www.itu.int/ITU-D/icteye/Indicators/Indicators. aspx [Accessed: 12th June 2012].

Ivatury G and Pickens M (2006) Mobile phone banking and low income customers: evidence from South Africa. Consultative Group to Assist the Poor (CGAP), The World Bank and United Nations Foundation, Washin gton, DC. [20] [Online] http://www.cgap.org [Accessed 04/04/2008].

Jagun A, Heeks R and Whalley J (2007) Mobile telephony and developing country micro-enterprises: a Nigerian case study. *Development Informatics Working Paper* 29, Institute for Development Policy and Management, University of Manchester.

Kalakota R and Whinston A (2002) *Frontiers of e-com-merce*. Pearson Education.

Kamel S and Hassan A (2003) Assessing the introduction of electronic banking in Egypt using the Technology Acceptance Model. *Annals of Cases on Information Technology*. Idea Group Publishing, Hershey, PA: 1–25.

Kim JW, Lee BS, Shaw MJ, Chang HL and Nelson M (2001) Application of decision tree induction techniques to per-sonalized advertisements on internet storefronts. *Interna-tional Journal of Electronic Commerce* 5(3): 45–62.

Kini R and Thanarithiporn S (2004) Mobile commerce and electronic commerce in Thailand: a value space analy-sis. *International Journal of Mobile Communications* 2(1): 22–37.

Kleijnen M, de Ruyter K and Wetzels M (2004) Consumer adoption of wireless services: discovering the rules while playing the game. *Journal of Interactive Market-ing* 18(2): 51–61.

Koivukoski U and Raisanen V (2005) *Managing mobile services: technologies and business practices*. John Wiley and Sons, Chichester, UK.

Kulviwat S, Chiquan G and Napatsawan E (2004) Determi-nants of online information search: a critical review and assessment. *Internet Research* 14(3): 245–253.

McCreadie M and Rice R (1999) Trends in analysing access to information. *Information Processing and Management* 35(1): 45–99.

Michael S and David S (2003) A model for small business new technology adoption: the case of mobile commerce. *Proceedings of 2003 ASBE Conference, Houston, Texas*, Mar. 5.

Microsoft ENCARTA World Atlas (2008) *Microsoft ENCARTA World Atlas 2008*. Microsoft Corporation.

Milne C (2000) Affordability of basic telephone service: an income distribution approach. *Telecommunications Policy* 24(10): 907–927.

Milne C (2006) Improving affordability of telecommunica-tions: cross-fertilisation between the developed and the developing world. *Telecommunications Policy Research Conference*, George Mason University, Virginia.

Mylonakis J (2004) Can mobile services facilitate com-merce?' Findings from the Greek telecommunications market. *International Journal of Mobile Communica-tions* 2(2): 188–198.

Nambisan S and Wang YM (2000) Web technology adoption and knowledge barriers. *Journal of Organisational Computing and Electronic Commerce* 10(2): 129–147.

News Agency of Nigeria (2012) Pepper and tomatoes on display at Wuse market in Abuja as organised labour suspends nationwide strike against fuel subsidy removal on Monday (16/1/12). [Online] http://www.nannewsngr.com/picture/pepper-and-tomatoes-on-display-at-wuse-market [Accessed 25 October 2012].

Nigerian Communications Commission (2012) Monthly subscriber data (October 2011–September 2012). Nigerian Communications Commission. [Online] http://www.ncc.gov.ng/ [Accessed 25 October 2012].

Nkamnebe AD (2008) Women and micro credit financing in Nigeria: implications for poverty alleviation and fight against vulnerability. Growing Inclusive Markets Conference, Dalhousie University, Halifax, Nova Scotia, Canada.

Norton S (1992) Transaction costs, telecommunications, and the microeconomics of macroeconomic growth. *Economic Development and Cultural Change* 41(1): 175–196.

Okoli C and Mbarika VAW (2003) A framework for assessing e-commerce in sub-Saharan Africa. *Journal of Global Information Technology Management* 6(3): 44.

Panos Brief (2005) *Telephones and livelihoods: How telephones improve life for rural people in developing countries*. The Panos Institute, London.

Parikh TS and Lazowska ED (2006) Designing an architecture for delivering mobile information services to the rural developing world. In *Proceedings of the 15th International Conference on World Wide Web* (Edinburgh, Scotland, May 23–26, 2006) ACM Press, New York. [Online] http://doi.acm.org/10.1145/1135777.1135897 [Accessed 25/03/2008].

Reed M (2008) *World's fastest growing mobile market*. Informa Telecoms and Media Research Service. [Online] http://http://tradeinservices.mofcom.gov.cn/ [Accessed 06/08/2008].

Robson C (1993) *Real world research*. Blackwell, Oxford.

Saunders M, Lewis P and Thornhill A (2000) *Research methods for business students*. 2nd edition. Pearson Education, Harlow.

Sen A (1999). *Commodities and capabilities*. Oxford University Press, Oxford.

Seth A, Gupta H and Momaya K (2007) Quality of service parameters in cellular mobile communication. *International Journal of Mobile Communications* 5(1): 68–93.

Sey A (2009) Exploring mobile phone-sharing practices in Ghana. *Info* 11(2): 66–78.

Snowden S and Spafford J (2006) Technology acceptance and m-commerce in an operational environment. *Journal of Enterprise Information Management* 19(5): 525–539.

Souter D (2005). *The economic impact of telecommunications on rural livelihoods and poverty reduction: a study of rural communities in India (Gujarat), Mozambique and Tanzania*. Commonwealth Telecommunications Organisation.

Stanoevska-Slabeva K (2003) Towards a reference model for m-commerce applications. *Proceedings of ECIS Conference*, Naples.

Tarasewich P, Nickerson RC and Warkentin M (2002) Issues in mobile e-commerce. *Communications of the Association for Information Systems* (8): 41–64.

Turban E, King D, Lee J and Viehland D (2002) *Electronic commerce: a managerial perspective, 2/e*. Prentice Hall, Upper Saddle River, NJ.

United Nations Conference on Trade and Development (2002) *E-commerce and development report*. United Nations Conference on Trade and Development.

Venkatesh V and Morris M (2000) Why don't men ever stop to ask for directions? Gender, social influence and their role in technology acceptance. *Management Science* 21(1): 115–139.

Venkatesh V and Ramesh V (2006) Web and wireless site usability: understanding differences and modeling use. *MIS Quarterly* 30(1): 181–206.

Walsham G (1993) *Interpreting information systems in organisations*. Chichester: Wiley.

Williamson OE (1975) *Markets and hierarchies: analysis and antitrust implications*. New York, NY: Free Press.

Wu JH and Wang SC (2005) ''What drives mobile commerce? An empirical evaluation of the revised Technology Acceptance Model. *Information and Management* 42): 719–729.

Xu Y (2003) Mobile data communications in China. *Communications of the ACM* 46(12): 81–85.

Yin RK (1994) *Case study research, design methods*. 2nd Edition. Sage Publications, Newbury Park.

Yin RK (2003) *Case study research: design and methods*. 3rd Edition. Newbury Park: Sage Publications.

Zeng EY, Yen DC, Hwang HG and Huang SM (2003) Mobile commerce: the convergence of e-commerce and wireless technology. *International Journal of Advanced Media & Communications* 4(3): 302–322.

About the authors

Dr. Richard Boateng is senior lecturer in information systems at the University of Ghana Business School. He is also the associate editor of the *Information Technologies & International Development Journal*. Richard is a Chevening Scholar and a Dorothy Hodgkin Scholar. His research interests include e-governance, cyber crime, electronic business, mobile commerce, green IT and ICT for development. Richard can be reached at richboateng@ug.edu.gh and on www.pearlrichards.org. Contact: University of Ghana Business School, PO Box LG 78, Accra, Ghana. Tel: +248852426. Email: richboateng@ug.edu.gh

Dr. Robert Hinson is an Associate Professor and immediate past Head of the Department of Marketing and Customer Management at the University of Ghana Business School. Currently a visiting Associate Professor at the University of the Free State Business School, he is published in reputable international journals like the *International Journal of Market Research, Thunderbird International Business Review* and the *International Journal of Public Sector Management*. Dr Hinson has also contributed to *Information Development* and is a member of its Editorial Advisory Board. Contact: University of the Free State Business School, University of the Free State, PO Box 339, Bloemfontein 9300, South Africa. Email: hinsonrobert@gmail.com)

Dr. Longe Olumide is on Faculty at the Department of Computer Science, University of Ibadan, Nigeria. Dr. Longe has been a MacArthur Scholar, an MIT MISTI Africa Scholar and a Fulbright Fellow. His research focuses on using social theories and technology frameworks to explain ICT adoption, causation, apprehension and treatment of cyber crimes. Contact: University Academic, Department of Computer Science, University of Ibadan, Ibadan, Nigeria. Tel: +2348024071175. Email: longeolumide@icitd.org *or* longeolumide@fulbrightmail.org

Ms. Rakiya Galadima is a business analyst at Total E&P, Nigeria. She holds a postgraduate degree in Management Information Systems from University of Manchester, UK. Her research interests include mobiles for development and enterprise information systems. Contact: Block A1, SA4, 1004 Estate, VI, Lagos, Nigeria. Tel: +2348034293810. Email: rakiya@pearlrichards.org *or* rakiyagaladima@yahoo.ca