Enhancing Micro-Trading Capabilities through Mobile Phones – The Case of Women Traders in Ghana

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Abstract— This paper investigates the impact of mobile phones on the micro-trading activities of women traders in Ghana. The research develops a conceptual model analyzing the impact of mobile phones on pre-trade, during-trade and post-trade activities. A case study approach is adopted and the findings suggest that traders primarily use mobile phones to communicate and exchange information in pre-and post-trade activities. A few traders innovatively also use them to manage customer details and scheduling deliveries in during-trade activities. This innovative use of mobile phones is a function of their pre-knowledge which may have been developed through formal education and/or social networks. Improving information management through mobile phones directly or indirectly contributes to the economic empowerment of the trader. The study concludes that developing the capabilities of the poor to use basic mobile functions and services, beyond voice calls, should define the agenda of future research, polices and strategies towards the “mobiles for development” movement. The conceptual model developed may inform future research in mobile phones and micro-trading activities.

Keywords: Mobiles Phones, Development, Micro-trading, Developing Economies, and Ghana

I. INTRODUCTION

There has been a tremendous growth in mobile phone ownership and use globally. Statistics from the International Telecommunication Union [1] tend to suggest that mobile phone subscribers currently constitute 60 percent of the world population. The report also suggests that there are now more mobile phone users in the developing world than in the developed world. In countries like Ghana, it is estimated that, there are 50 mobile phone subscriptions per 100 inhabitants, and further, the ratio of mobile cellular subscriptions to fixed telephone lines is 80 to 1 [2]. The rapid diffusion of this relatively low-cost technology has spurred a development agenda questioning how mobile phones can be harnessed more effectively for socio-economic development in developing economies and other resource-poor contexts.

Initial efforts to finding answers to these questions can be analyzed from two perspectives: the practitioner and academic research perspectives. The initiatives of mobile network operators, banks, entrepreneurs, governments and development agencies characterize efforts from the practitioner perspective. These efforts tend to focus on the design and adoption of mobile applications for micro-finance activities or to enhance access to financial services [3],[4]. Efforts addressing the impact of mobiles on development concerns and needs – combating poverty and stimulating economic growth – are quite few. This imbalance is also reflected on the academic research front [5]. There is a preponderance of research studies documenting the business models which characterize the initial efforts of practitioners, mobile operators and banks. Academics are yet to catch up with studies seeking development solutions through mobile phones [5],[6]. Some of the few studies making strides at correcting the imbalance argue that there are complexities of factors which affect the poor and hence, make it challenging for researchers to conceptualize the associated needs and impact of mobile phones with one theoretical model or theory [7]. This often contributes to the blurred distinctions between amplification and transformational effects and also between social and production (business) spheres in adoption and usage [3]. Thus, future studies will have to draw on a more comprehensive approach to evaluate the multi-stranded impact of mobile phones on the livelihoods of adopters.

This paper responds to this call for research. The paper investigates the impact of mobile phones on
the micro-trading activities of women traders in Ghana. Extant literature has fairly covered studies on the mobile phones usage and mobiles for development in sub-Saharan Africa. The studies include mobile phones and fisherman and farmers in Ghana [8]; mobile phone sharing practices in Ghana [9]; mobile phones and development in Nigeria [6],[10]; and mobile phone ownership and social capital in Tanzania and South Africa [11]. Despite these studies there is a call for more studies to test earlier findings in different contexts and in different micro-economic activities in order to contribute to better understanding of the impact of mobile phones in developing economies. The underpinning research question is: What is the impact of mobile phones on the micro-trading activities of women traders in Ghana?

The paper is organized in six sections. Section one covered the introduction of the paper. Section two examines mobile phones and micro-trading to develop the research framework for this study. Section three presents the research methods for the study. Section four presents the case studies of two women traders. The analysis of the cases studies are presented in section five and the conclusions and directions for future research are discussed in section six.

II. USING MOBILES PHONES IN MICRO-TRADING

Transaction cost theory is arguably the most commonly used theory in studying issues relating to assessment of the impact of information and communication technologies (ICTs) on commerce or trade [12],[13],[14]. Transaction costs, described as “the costs of running a system” [15, p. 19], consist of two types of costs: coordination costs and actor motivation costs [13],[14]. Coordination entails all the information and communication related costs before, during and after a transaction. This includes the cost of searching for products, services, sellers, and buyers, and negotiating and ensuring contract compliance and post-contractual agreements [16],[17]. Actor motivation costs entail the costs of having incomplete or asymmetrical information and imperfect commitment in a transaction. These costs affect decision-making and enforcement of compliance mechanisms, and contribute to the loss of contracts and contractual disputes [12],[14].

It is suggestive from the transaction cost perspective that trading is primarily about information. It involves the sharing and communication of information which leads to the exchange goods and services, and the management of relationships between parties involved. Hence, participants in a transaction seek for innovative ways to minimize costs in acquiring, assessing and communicating information for pre-trade, during-trade and post-trade activities [15].

As a technology, product or service, mobile phones have a potential impact on how trade is conducted. Mobile phones consist of features which offer opportunities for diverse functionalities and applications. Extant research in relating mobile phones and commerce have noted features and attributes including personalization, ubiquity, localization, immediacy, and instant connectivity [18],[19],[20]. Ubiquity highlights easy access to information in real time as well independent communication based on the user’s location. Buyers and sellers become relatively accessible and can be contacted anywhere at any time. It also gives them the choice to limit their accessibility to particular persons or time. Personalization works in relation to obtaining new information to create services which helps customize the end-user experience. Localization makes it possible to know where the customer is at a particular moment and to create a match between services, customer’s location and preferences.

The combination of these features and attributes of mobile phones in transactional activities in trade has the potential of generating strategic, relational and operations benefits for the trader. These benefits are related to the posited benefits of using ICTs in commerce or trade [21],[22]. However, in this paper, the mobile phones are the form of ICTs being discussed. Operational benefits are associated with the reduction in coordination costs in delivery of products, goods and services in the market place. Traders will be able to communicate directly with potential customers and trading partners on the availability of goods and services. Information on the quality, quantity and delivery times of goods can be exchanged. This may contribute to reduction in costs of searching for goods, services, buyers and sellers; reduction in delivery and inventory costs especially for perishable products; reduction in risk in frequent long journeys for goods; and increase in the timeliness in decision-making, negotiating and fulfilling transactional terms [8],[10]. Achieving operational benefits can build up to relational benefits.

Relational benefits are associated to the benefits of improved communication and relationships between actors involved in a transaction. The ubiquity, localization and personalization features of
mobile phones can lead to disintermediation where traders may bypass or avoid ‘middlemen’ and shorten distribution channels to transact directly with potential customers and trading partners [10]. This improved and direct communication may increase the motivation and confidence and understanding between traders and their customers and trading partners. These relationship benefits may build up to strategic benefits.

Strategic benefits are associated with benefits which increase the market “reach” (access new markets) and the performance of traders. Operational and relational benefits can build up the trust for market participants to engage in long term relationships in the good of all [23]. These benefits include the deepening of relationships loyalty and retention between traders and their customers and trading partners; product and service differentiation and personalization; and increase in the “reach” through improved reputation, recommendations and referrals. In effect, increase in market reach could stimulate the growth and performance for the trader.

Beyond the benefits obtained from using mobile phones, the next question to be asked, is the potential impact or effect on trade. From the mobile phones for development perspective, mobile phones are conceptualized to have three effects on its adopters – incremental or amplification, transformational and production [6],[24]. Incremental effects characterize benefits from using mobile phones to improve what traders already do. These include the communication and information exchange with customers and trading partners through use of voice calls and text messages. Transformational effects characterize benefits from using mobile phones to create something new – opportunities and access to services and support which were not previously available or readily accessible. These effects include the use of mobile phones to access new services such as mobile banking, mobile advertising, mobile Internet and other related location-based services. Production effects characterize benefits from not using mobile phones but trading or selling mobile phones and related services. Production effects may also contribute to transformational effects in the livelihoods of micro-entrepreneurs or retailers engaged in production activities. Examples have been documented in studies on new livelihoods of women in the Grameen Village Payphone initiatives in Uganda, Bangladesh and many others engaged in re-selling airtime vouchers and pre-paid cards [7].

With regards to market traders, we are more likely to expect incremental and transformational effects. Production effects may be experienced by traders who engage or expand their businesses to engage in the re-sale of airtime vouchers and pre-paid cards.

In summary, regarding micro-trading, traders may use mobile phones in pre-trade, during-trade and post-trade activities. This application of mobile phones in trade may generate operational, relational and strategic benefits which may have an incremental, transformational and/or production effect on the micro-trading activities of traders. Figure 1 illustrates this summary in a conceptual framework of the impact of mobile phones on micro-trading.

**Figure 1 Conceptual Framework of the Impact of Mobile Phones on Micro-Trading**

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Mobile Phones</th>
<th>Stages of Trading</th>
<th>Benefits</th>
<th>Impact</th>
</tr>
</thead>
</table>
| Women Traders |                | Pre-Trade Activities | Strategic Benefits  
|               |                | During-Trade Activities | • Extension in Reach  
|               |                | Post-Trade Activities | • Loyalty and Retention of Trading Partners and Customers  
|               |                |                        | • Product/Service Differentiation  
|               |                |                        | • Improved Revenue  
|               |                |                        | Relational Benefits  
|               |                |                        | • Improved Communication  
|               |                |                        | • Improved Relationships  
|               |                |                        | • Disintermediation  
|               |                |                        | Operational Benefits  
|               |                |                        | • Reduced Transactional Costs  
|               |                |                        | • Time Efficiency  
|               |                |                        | Incremental Effects  
|               |                |                        | Transformational Effects  
|               |                |                        | Production Effects  

III. RESEARCH METHODS

The study seeks to investigate the impact of mobile phones on micro-trading activities of women traders in Ghana. An exploratory case study approach was adopted since it strongly supports the research objective set at the beginning [25]. This research also sought to benefit from the rigors of designing, collecting and analyzing data as discussed by De Vaus [26].

The data was collected over a two-month period; from October to November, 2009. Two sets of interviews were conducted. The first set of interviews was conducted with women traders. Semi-structured interviews were conducted with 17 women traders in two markets in Accra, capital city of Ghana. Two traders were selected from the 17 women traders for an in-depth study of their micro-trading activities. The second set of interviews were conducted with the two of the marketing personnel of one of the five mobile network operators in Ghana and two resellers of mobile pre-paid cards and mobile accessories. There are currently 5 major network operators in Ghana, namely: MTN, TiGO, Zain, Kasapa, and Vodafone. The interviews were conducted with marketing personnel from TiGO and resellers of prepaid cards and mobile accessories with respect to the services that have become beneficial to market traders. The interviews in both sets of interviews were recorded and transcribed, with copies of transcribed interviews and further discussed with the interviewees to check and resolve discrepancies. The approach to analyzing the case study was primarily by use of pattern-matching logic as explained by Yin [30]. We sought for results that can strengthen the validity of our theoretical framework (Figure 1), further by scrutinizing the context of the case and detailing findings to provide answers to the research question.

IV. CASE FINDINGS

A. Case A: The Tomato Retailer

Aunty Akosua (hereafter referred to as AA) is a tomato retail trader at the Makola market in Accra, Ghana. She has a junior high school level of education and has been working as a tomato retailer since June 2008. AA works with Jane who serves as an intermediary between the farmers in the villages and her. Jane buys the tomatoes at a wholesale price from the farmers and AA retails them at the market.

Prior to owning a mobile phone, communication between AA and Jane was constrained by distance. The limited access to Jane often contributed to poor inventory management, where AA could be out of stock of tomatoes for a week. In such scenarios, AA had to buy from other wholesalers, and that increased her coordination costs. She was then advised by a friend to get a mobile phone for Jane and herself, in order to enhance communication and reduce the cost and risk of frequent long journeys. In December 2008, AA purchased a used Samsung D500 for herself and a Nokia 3315 for Jane. The cost of Jane’s mobile phone was deducted from her earnings from trading with AA. They are both using TiGO as their service provider. The cost of the mobile phones is shown in Table 1.

<table>
<thead>
<tr>
<th>Mobile Handset Model</th>
<th>Cost of New Handset (USD)</th>
<th>Cost of Used Handset (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung D500</td>
<td>35-70</td>
<td>20-35</td>
</tr>
<tr>
<td>Nokia 3315/3310</td>
<td>30</td>
<td>20-25</td>
</tr>
</tbody>
</table>

The availability of text messaging function is an added advantage for AA, since it is cheaper to send a text message than making a voice call. She uses text messages alongside voice calls to communicate more frequently with customers. She opined that “Most of my customers are in the working class, meaning they do not have much time to come to the market. I therefore call or text my customers periodically and ask them if they are in need of any tomatoes and then I deliver to them at their offices before they close”.

The mobile phone enables AA to keep a record of the contact details of her customers. Other tools like calendar and alarms on the mobile phone are also used by AA. She notes that, “Some of my customers have even scheduled with me the specific days for which they will need my tomatoes. I have therefore placed it on my phone as a reminder so I don’t forget them. Therefore, I do not need to be at the Makola market everyday but still make my money”.


The improved communication and information management has improved her relationship with her customers and suppliers.

B. Case A: The Maize Retailer

Maize is a seasonal produce which requires cost-saving techniques in its trading activities. The old dry maize is preferred to the fresh one, for this reason planting and harvesting are well planned by farmers. Maize wholesalers buy produce from farmers in villages and sell to retailers in Accra, the capital city. Grace is a maize wholesaler who has four retailers in Accra. She has a primary school level of education and learned the trade from her mother. She uses two Nokia 3310 mobile phones and subscribes to MTN and TiGO network services.

The mobile phone has made it easy for her to carry out her transactions more efficiently. She does not have to travel frequently to do her business unless she has to go round to collect her payments. This she does once in a month. Grace explains that, “I don’t need to come to Accra to supply maize: all I do is take the orders on the phone and hire a truck to send the commodity. I don’t have to put my life at risk by making unnecessary journeys”.

Mobile phones make Grace more accessible to her customers which enhance their confidence in trading with her. Grace mentions that “Supply of maize is controlled by monitoring prices on the market. Prices determine how much goods should be supplied at a point in time. I am able to send simple text messages to inform customers on maize prices and delivery times. Customers are also able to monitor the trucks that bring the commodities to the Makola and Madina markets in Accra. This enables the customers to plan for contingencies”.

The timely delivery of trade information enhances decision-making in transactions and therefore contributes to reducing actor motivation costs. Without mobile phones, it would be difficult for Grace to co-ordinate activities more readily.

V. DISCUSSION

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

A. Mobile Phones and Micro-Trading

Out of the 17 women traders interviewed, 88 percent noted that they used mobile phones for pre-trade activities; 18 percent used them for during-trade activities and 82 percent used them for post-trade activities. The findings suggest that traders tend to find mobile phones to be more useful for pre-trade and post-trade activities. The traders adopted mobile phones because of the perceived benefits obtained by other traders and their competitors. Pre-trade activities include ordering goods directly from farmers or through intermediary wholesalers and informing customers on the availability of goods. Post-trade activities include contacting customers to follow-up on services provided and address inquiries and complaints. These activities are perhaps most critical to establishing and maintaining transactions. Hence, as earlier argued, traders are more likely to use mobile phones to reduce the costs of acquiring and communicating information needed for these stages of trade [15]. On the other hand, the 18 percent of traders who used mobile phones for during-trade activities had at least had some of primary level of education, which perhaps contributed to their ability to identify and integrate other mobile functions into during-trade activities. During-trade activities include scheduling the supply of goods through the calendar tools; calculating sales and purchases; and calling employees in other marketplaces to monitor the demand for goods and pricing strategies of competitors. These traders also often received help from friends, relatives and sometimes customers in learning some of the functions of mobile phones. This ability to identify basic functions in mobile phones and integrate them in trading activities is arguably a function of the some level of education and the perceived ease-of-use the mobile phones they owned. The perceived ease-of-use was influenced by the mobile literacy of the trader which stemmed from informal education through social networks. These interrelationships between technology adoption and use and owner/adopter characteristics are consistent with findings from previous research [3],[27]. The informal education through social networks, however, iterates the blurred distinctions between the social and productive (business) spheres in the adoption and usage of mobile phones [3],[5].

These findings are suggestive of the first lesson:

Lesson One: The innovative use of mobile phones in micro-trading is influenced by the pre-knowledge of the trader which may have been developed through formal education and/or social networks.

B. Benefits Obtained

The benefits obtained by the traders are primarily operational and relational. Both AA and Grace intimated on how mobile phones have helped reduced the cost of coordinating their operations, reduced the risk in making unnecessary journeys, and
enhanced communication with customers and trading partners. The enhanced communication with customers enabled the traders to build up a relationship with their customers in which each considers the other as a trusted party. In Case A, AA schedules the various times of customers who need tomatoes using her calendar functionality on her mobile phone. In Case B, customers are able monitor delivery times of goods and plan for contingencies through text messages. This communication medium creates a borderless environment or redefines the “place” factor in transacting business with customers and creating more personalized services for them. Personalized services lead to deepened relationships which can contribute to customer loyalty and retention.

However, the extent of usage of the mobile phones is mediated by affordability and accessibility of mobile services. Concerning accessibility, poor network coverage in rural areas where farms are located often affects communication with trading partners. Wholesalers, like Grace, find it difficult to communicate with customers in Accra when they travel to some villages to buy maize from farmers. Hence, Grace subscribes to two mobile network operators and uses the operator with better network coverage depending on her location. Seven other women traders interviewed also intimated on subscribing to more than one network operator to take advantage of service promotions and network coverage. Concerning affordability, the high cost of mobile phones and the initial connection charges is another barrier. Traders, as with Grace and AA, usually purchase used-mobile phones. They also consider top-up airtime vouchers to be inexpensive since they are sold in relatively low denominations. According to the personnel from the TiGO mobile network operator, the competition in the mobile industry has increased; each network operator is in a consistent search for the best product for the market. He states that “With the concept of the triple “A”, which makes our services Affordable, Accessible and Available, the ordinary trader in Ghana has the means of getting “hooked up” to this service”. Promotional services which offer reduced costs of calls to ‘favorites’ and ‘friends and family’ are primarily used by most small businesses and micro- enterprises to communicate with key customers. Therefore even though some retailers earn low incomes, they still find it beneficial to own mobile phones by keeping the cost of owning and operating the mobile phone low. In Case A, AA had to purchase two mobile phones – one for Jane, her employee, and the other, for herself – and subscribe to the same mobile network. Thus, the use of the mobile technology in trading is determined by the readiness of the actors in the transaction to own/access and use a mobile phone. This readiness partly defines the benefits obtained. These findings are suggestive of the second lesson:

**Lesson Two:** In micro-trading activities, the benefits obtained by the trader tends to be partly influenced by the extent of mobile phone usage by the trader and other actors – customers and trading partners - in the value chain.

C. Impact of Mobile Phones on Micro-Trading

Concerning the impact on trading activities, the traders primarily experienced incremental benefits. The traders predominantly used mobile phones to improve existing trading activities. These include the communication and information exchange with customers and trading partners through use of voice calls and text messages. Little can be said about transformational impact of mobile phones. Contrary, as compared to previous research on the mobile phones usage by fishermen and farmers in Ghana [8], there is no evidence of the use of mobile banking services in these micro-trading activities. This finding, perhaps, stems from the differences in the economic volume and type of transactions involved in fishing and farming as compared to micro-trading activities of traders interviewed in this research. The use of mobile phones for record keeping of customer details and scheduling of deliveries may also be considered as incremental effects since traders traditionally keep such information in notebooks and diaries. There is also no evidence of production effects, none of the traders were engaged in the selling of mobile services and accessories. They intimated that the retail of mobile pre-paid cards is highly patronized by mobile kiosk entrepreneurs, street vendors and hawkers. This is not an attractive business venture for market traders who traded in food stuffs. The nature of micro-trading activities therefore led to primarily incremental effects on trading activities.

These findings are not far from that of previous research which highlights the absence of transformational impact and more of the presence of additive or incremental impact in the adoption of mobile phones in resource-poor contexts [7], [24]. However, while transformation effects may not be evident in the trading activities, they may be evident in exploring the impact of mobile phones from a more multi-stranded perspective. A multi-stranded impact of mobile phones may include assessing its
impact in empowering individuals economically (income, decision-making power and control over economic transactions) and socially (widening network of beneficiaries and gender roles) [7].

Economic empowerment is evident in both case studies presented above. For example, Grace stated that: “…I am able to send simple text messages to inform customers on maize prices and delivery times.” AA also emphasized that: “…Therefore, I do not need to be at the Makola market everyday but still make my money”.

In this respect, the findings suggest, that the women traders have gained some economic empowerment in improved income from cost reduction and increased decision-making and control in transactions with trading partners and customers. Thus, the transformational impact observed is the economic empowerment for the traders. The findings are suggestive of the third lesson is:

Lesson Three: In micro-trading activities, since trading is primarily about information, improving information management through mobile phones directly or indirectly enhances decision making, control and income generation, and by this means contributes to the economic empowerment of the trader.

Figure 2 summarizes the findings in a framework of the impact of mobile phones on micro-trading activities of women traders in Ghana.

VI. CONCLUSION

This research has generated valuable insights and lessons for research and practice. The study shows that, regarding micro-trading, traders use mobile phones for primarily pre- and post-trade activities. Some traders, though few in number, innovatively use them to manage customer details and scheduling deliveries during trade. This innovative use of mobile phones in micro-trading is influenced by the pre-knowledge of the trader which may have been developed through formal education and/or social networks. The traders obtain operational, relational and strategic benefits which may have incremental and transformational effects. The type of benefits obtained by the trader tends to be partly influenced by the extent of mobile phone usage by the trader and other actors – customers and trading partners - in the value chain. Hence, the readiness of the actors to own and use mobile phones play a critical role in determining the benefits obtained by trader and also by the actors. However, while the benefits obtained primarily lead to incremental effects, the transformational effects do not directly refer to the creation of new services in the micro-trading activities, as earlier argued. They were observed as the economic empowerment of the women traders. In addition, productive effects are absent due to the nature of micro-trading activities researched in this study.

Concerning implications to practice and policy, the innovative use of mobile phones in trading activities should be encouraged. Mobile network
operators, development agencies and policy makers should facilitate educational campaigns targeted at educating micro-enterprises and micro-traders on basic mobile functions and services – beyond voice call – which may enhance their business activities. Such advocacy initiatives contribute to empowering their “capability to function”. As Sen [28, p. 75] explains the “capability to function” is what really matters to the poor and non-poor person. In doing so, researchers have to also start investigating on the actual functions and services “the poor” use on the mobile phones, and perhaps, generate insight to inform the design and development of mobile phone functions and services which empower the capabilities of the poor and contribute to sustaining their livelihoods. The work of Parikh and Lazowska [29] in India has taken a step in doing so. However, there is still much to be done across the developing world.

This study was limited to only the case studies of women traders in Ghana. Future research may focus on a quantitative approach using survey methods to test how the findings are reflective on a larger population of traders and in different developing economies. The conceptual framework, Figure 1, developed in this study may also be used in future research to analyze mobile phones and other micro-trading activities such as taxi services in transportation, and carpenters and potters in manufacturing. Further research is important to develop a better understanding of how mobile phones can help sustain livelihoods in resource-poor contexts.

This work is not in any way exhaustive. The findings and lessons are stepping stones towards the “mobiles for development” movement, which is rapidly expanding. The reality in practice may require more effort and further research.

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