

Mobile Money Information System Architecture for Open Air Market in Ethiopia¹

Woldmariam Fikre Mesfin,

Addis Ababa University, Ethiopia, mesfinfw@gmail.com

Abstract

This research intends to explore, analyze, and identify design concepts for the development of a mobile money information system that can support rural communities in developing countries who transact in an open air market. Existing mobile money architectures overlook value storage and the everyday monetary practices of individuals, they mainly deal with payment related issues and procedures based on bank accounts. They also target urban people, who have banking and technology know-how. There is a clear knowledge gap that this research hopes to fill.

The majority of the study population cannot write or even read their names; they identify currency notes based on their color and size and not on the values inscribed on them. This raises the question, how could illiterate individuals transact in an electronic payment ecosystem? The purpose of this study is to thoroughly analyze and understand the characteristic nature of cash transactions and usage scenarios among study participants in an open air market in order to identify design concepts and provoke discussions on this issue.

Methodologically, I used qualitative methods, data was collected through observation, discussions, and interviews with key market participants and as well as photographs and videos. I found that almost all merchants: (1) use the color of currencies to identify one from the other and to make mathematical computations, (2) some merchants want to merge sales of different items while some others want to keep sales of different items separate, (3) due to transaction practices, merchants have many problems and make many errors and mistakes, (4) merchants who have no formal education expressed that they would like to have devices that operate by sound, and (5) sellers and buyers set prices of certain items through negotiation. The results of the study can contribute towards the development of cashless transactions based on mobile phones.

¹ The modified form of this paper is presented on ICT for Smart Society (ICISS), 2013 International Conference in Indonesia, Jakarta from June 13-14. It is available on www.ieeexplore.org

In order to identify design concepts for mobile money in the context of an open air market, data was collected from participants in 14 different open air markets in rural areas of Ethiopia. The research was carried out over two time periods: from September to the end of November 2012 and from May to June 2013. The everyday practices of people were similar at the different open air sites. Unlike in supermarkets in urban areas, in rural open air markets people usually meet two days a week for transaction purposes. One of the two days is usually a busier day. Selection of respondents was random between different religions (Christians and Muslims), age groups (16-95 years old), level of education (0 grade – BA degree), years of business experience (0.5 year – 30 years), and market segment (fruits and vegetables, cereals, clothes, sheep & goats, oxen and cows).

This following section outlines and discusses the common practices that merchants (sellers) and buyers (customers) perform during open-air transactions. These includes how (1) they identify currency notes, (2) how they organize their daily sales transactions, (3) errors and mistakes they make, (4) features of an automated tool that they would like to have, if any, and (5) procedures of price negotiation.

1. Currency Identification

Both sellers and buyers, with no formal education, identify bank notes based on their color. These individuals cannot write or read any numbers and cannot make any mathematical computations by writing. But, for example, they know the sum of 10 birr² and 5 birr will give 15 birr and yet do not know how to spell these numbers. If asked to pickup say a 50 birr note from a lump of other notes with different denominations, they easily identify the value through the color of the notes. *Thus, it could be said that the color of money notes is a means to identify currencies as well as for mathematical computations.*



Figure 1, individuals sort and identify currency notes based on color

2. How Merchants Organize Sales

Examining how merchants organize their sales revealed that some merchants prefer using a single common money handling bag (figure 2) while others prefer to use separate money bags for each item (figure 3). Each of these has its own perceived advantage and disadvantages.

² Birr is Ethiopian currency. It has denominations of 1, 5, 10, 50, and 100.

Retail merchants engaged in selling items like charcoal, fruits & vegetables, clothes, and cereals as well as sellers in the animal market, prefer to use single common money bags. They confirmed that the use of a common bag has advantages such as that it is convenient to control and manage money, that it reduces the problem of too much change during a transaction, avoids loses as the result of putting money here and there in different bags and in the case of a mass conflict in the market, it is easy to collect and run away with the money. But, it also has some limitations (according to the respondents) for example, when money is in one bag it attracts thieves and violence. It is also difficult to know how much profit was taken from each item.



Figure 2: Use of single money bag

There are also merchants that prefer the use of separate money bags. These merchants are usually interested in knowing the profit and or loss from each item category they sell. They also want to minimize risks of loses by putting money into different bags. The problem with this way of organizing money is that in case of “hurry time” (say a conflict in the market occurs), they may not have enough time to collect their money and run away.



Figure 3: The use of different bags per item

In the open market the micro business people (small retailer) who sell items like coffee, sugar, and salt maintain different cash collection bags. For example they keep all sales from coffee in one purse, sales from salt in another and sales from spices in yet another. When they provide change for the sale of an item, they use the change from the respective purse. But, if they have no change in that purse in that moment, they take it from another purse and replace the amount later. When asked why they do this, they replied that keeping these sales separate enables them to easily know the daily sales from each items, the net profit of each items and the most profitable items in their portfolios. At the end of the transaction day, almost all merchants arrange their cash money according to its denomination and then count (calculate) the sales from each item categories, and then aggregate the grand total.

3. Common mistakes and errors and problems that merchants make

Merchants were also asked about the errors and mistakes that they make during transactions. Due to the fact that customers do not queue properly, a lack of prepackaging, and the absence of price tags on items, merchants often make errors and mistakes during busy hours. They are not sure who has paid them and who did not, how much money was received and whether change was needed or not.

4. Problems with nature of cash

Cash can get lost in the wind; cash can stick together and be counted as one; merchants can receive forged cash notes and lack change. If you have say 100 USD and need to pay 5 USD, how do you do that if there is no change? There are also situations when some customers leave without paying (intentionally-while the merchant looks busy and unintentionally-when they are busy themselves). Some customers also try to cheat by folding money notes so that the merchant will count as if it is two. As far as problem of conflict due to ethnicity, religion or politics in the market is concerned, the researcher comes to understand that almost all individuals have a lot of worry. If in case it happens, it is distracting and many merchants and customer lose many of their properties while trying to run away.

5. Feature of automated tools that merchants would like to have, if any

This was mainly asked in order to provoke responses about future needs and to act as a starting point for new concepts. Thus retail merchants were also asked what kind of features on an automated tool they would be interested in to aid open air transactions. It appears from their response that they have diverse needs and interests. Most of them indicated that they are

interested in machines (tools) that would protect their money from thefts, handle money easily, be able to identify the profit & loss from each item category, and identify cheaters.



Figure 4: diagram showing lack of queuing by customers and busy merchant

For example a 66 years old woman said “I very much appreciate if I can get a tool that calculate profit, loss, cost, and sales, that controls thefts even in case of conflict in the market, and capable of protecting others from taking away money, if in case I lost the device”.

In addition to these, many of the respondents of 40 and above, who have no formal education expressed their interest in a machine that cannot be stolen, that can tell balances by sound, that can do financial mathematics (sales, costs, profit & loss, changes), that can tell when merchants are making mistakes, that can be integrated with mobile phones for alerts, and that is capable of counting money. “As I am too old, I prefer a machine that can identify and tell me the money customers pay me, that counts, able to identify customers who tries to cheat me” said a 95 year-old man. Respondents also expressed an interest in “ease of use”. They specifically indicated that they want such machines to be easy to use, cheap, durable, and easy to carry. They also expressed an interest in a machine that is able to generate change during transactions, and one that can signal its location to a cell phone should it be stolen.

6. Practices and problems of market assignments by customers

Discussions and observations regarding the practices of customers reveal that they delegate each other jobs. As the open air market places are too distant from their homes, it is not possible for everyone to go to market and buy items they need. As a result, they delegate/assign someone to do all their purchases on their behalf. It was found that delegates usually get confused about how much and which items they are to buy, as well as the amount of money received for this purpose. To avoid such confusion illiterates keep their personal money separate from the delegate’s money. When making the purchases and payments, such individuals also make the payments separately one after the other and collect change separately.

Regarding the accuracy of the total payments and change, these individuals also rely on what is told to them by the merchants, but sometimes they also ask for help from someone around.

Relatively educated individuals keep all monies together and keep some sort of reminder, such as a list of items to be purchased written on a piece of paper, (similar to merchants who use common bags above). Accepting such assignments from many people, puts him/her at risk of thefts, robberies, and accidental loss.

7. Summary and conclusion

As discussed above mobile money design for open air market should consider practices of individuals like separately keeping different money, designing for illiterates (who identify money notes based on color and images on money), a way of making simple math (addition, subtraction, and division). It is also found that audio based and theft silence technologies are preferred.

Acknowledgement

I would like to acknowledge the Institute for Money, Technology & Financial Inclusion at the University of California, Irvine, for funding this research under OPP1031657, sub award number 2012-2809. Any opinions, findings, conclusions, and recommendations expressed in this paper are those of the authors and do not necessarily reflect the views of the Institute for Money, Technology & Financial Inclusion at the University of California, Irvine.