The cost of owning and using a cell phone has fallen dramatically, opening the door for mobile banking innovations, particularly in poor countries that generally have little in the way of traditional financial services. As a result, mobile banking seems poised to play an important role in the growth of economies.

A pioneering effort in Kenya, M-PESA, has grown to be the world’s largest mobile money service. This research brief is designed to introduce interested readers to some of the most significant studies on M-PESA. It draws primarily on two key studies by William Jack and Tavneet Suri on the impact M-PESA has had on financial services in Kenya. They document how innovative use of this new technology has improved financial services in Kenya. Other notable academic research cited in the brief supports and amplifies their findings.

**BACKGROUND**

Individuals and households in developing countries have long supported each other by sharing funds through informal networks. In the past, however, the absence or high cost of reliable transfer services has limited use of these kinds of exchanges. The introduction of mobile banking has allowed individuals to transfer funds by simple SMS technology or text messaging. This has dramatically reduced the cost and challenges of sending money long distances. Before the technology was available, most households delivered payments via hand or informally through friends or bus drivers. This process was fraught with delays and frequently involved substantial losses due to theft.

**M-PESA Basics**

**HISTORY.** M-PESA (M stands for “mobile” and PESA is the Swahili word for money) is the most widely adopted mobile phone-based financial service in the world. M-PESA was launched by Safaricom, the dominant mobile network operator in Kenya, which already had a 62% mobile phone penetration rate at the time of M-PESA’s launch. M-PESA has grown exponentially since its launch in 2007 to reach 14 million registered users by April 2011. (See Figure 1.) This means that about 70% of the adult population in Kenya has access to M-PESA.

New data suggests that M-PESA has also quickly reached the unbanked. Among the population outside of Nairobi, during a period of four years when the prevalence of bank accounts remained relatively flat, the share of the unbanked who used MPESA rose from about 21% in 2008 to 75% in 2011.

The number of M-PESA agents, who exchange cash for e-money when users deposit or withdraw funds, has grown in tandem. By April 2011, there were about 28,000 agents across the country, compared to roughly 1,100 bank branches. (See Figure 2.) The fast adoption of M-PESA would not have been possible without the creation of this dense agent network.
**Transacting with M-Pesa.** Using M-PESA, individuals can exchange cash for e-money at par with any M-PESA agent across the country, and transfer these balances via SMS to any other cell phone in the country (including to sellers of goods and services), even if the recipient is not registered with M-PESA and even if the phone operates on a competitor’s network. Depositing funds is free. There is a fixed fee of approximately 30 Kenyan shillings (about 40 U.S. cents) per SMS transfer. Withdrawals are charged on a sliding scale of 1-2%. (The price is higher if the recipient is not a registered user.) No interest is earned on account balances, and M-PESA does not make loans. During the period covered by the studies, central bank regulations limited individual M-PESA transactions to 35,000 shillings (about U.S. $470), and imposed a cap of 50,000 shillings (about $670) on account balances.

In a 2009 paper, Ignacio Mas and Olga Morawczynski noted that much of M-PESA’s success was due to these structural features like free deposits and no requirements for minimum balance. Customers pay only when they actually do something with their funds. Other favorable features are the ability to send money to non-customers and, through partnerships with PesaPoint, Equity Bank and Diamond Trust Bank, to make ATM withdrawals.

**Agent Network.** The M-PESA agents are organized into groups, according to three models. (See Figure 3.) In the first, one member of the agent group (the “head-office”) deals directly with M-PESA, while subsidiary agents, which are owned by the head office, manage cash and e-float balances through transactions with the head-office. Both the head office and the agents can transact directly with the M-PESA users.

In the second model, an aggregator acts as the head office and deals directly with Safaricom while managing the cash and e-float balances of its agents. However, the agents can be independently owned entities, with which the aggregator has a contractual relationship.

The final, and most recent, model allows a bank branch, called a “super-agent,” to perform as purely an agent for agents. The bank branch can trade cash and e-float with all M-PESA agents, but unlike the other two models, the bank does not trade e-float directly with M-PESA customers.
The super-agent model is one example of the integration of M-PESA services into the banking system. The cash collected by M-PESA in exchange for e-float is deposited in bank accounts, called M-PESA trust accounts.

**KEY FINDINGS**

M-PESA is an innovation that clearly dominates its money-transfer predecessors in virtually every respect. Users say it is faster, cheaper, more reliable, and safer, and a very large majority report that they would suffer significant negative consequences if it were to be shut down. However, the precise source of these benefits—the specific economic impacts of M-PESA—is not easy to calculate.

M-PESA facilitates the safe storage and transfer of money. As such, it has a number of potential economic effects. It makes it easier for people to pay for goods and services. Electricity bills, for instance, can be paid with a push of a few buttons instead of traveling to a distant office and waiting in a long line with a fistful of cash.

To study the actual impact of M-PESA on financial services in Kenya, Jack and Suri analyzed data from a large household panel survey conducted in 2008, with a follow-up survey the following year.
Remittances and Savings
The dominant reason customers use M-PESA by far is for sending and receiving remittances. (See Figure 4.) Domestic remittances, not just by M-PESA, are an important part of the financial lives of many households in Kenya. Making transfers across large distances trivially cheap leads to a number of economic benefits.

Because it facilitates timely transfer of small amounts of money, M-PESA makes it possible for urban-rural networks to maintain or increase their regular support as well as better manage the effects of unexpected downturns in income or other misfortunes. M-PESA also improves the allocation of human as well as physical capital. For instance, households may be more likely to send members to high-paying jobs in distant locations.

A 2008 paper by Olga Morawczynski argued that M-PESA supports the “dual system” in Kenya, namely the mutual support provided between rural households and family members who go to cities to seek work. The rural community remains a source of support for the urban worker during downturns, while urban workers help rural family members make ends meet with their remittances.

In a four-month study of migrant workers in the Kibera slum outside Nairobi, Morawczynski found that a majority of respondents interviewed were using M-PESA, which had just been introduced, to send remittances “to the rural,” often on a monthly basis.

A 2009 paper by Olga Morawczynski and Mark Pickens found that M-PESA users began to make smaller, more frequent transfers. In this study, the income of rural recipients rose by up to 30% once they started using M-PESA, because funds were remitted more frequently. By breaking up their transfers, urban migrants end up sending more money back home.

In her 2008 paper, Morawczynski interviewed M-PESA users and found that they also relied on the service to store money, either because banks were too far away or could not be trusted.

Because it facilitates inter-personal transactions, it can also improve the allocation of savings across households and businesses by deepening the person-to-person credit market.

A 2010 paper on the community-level economic effects of M-PESA by Megan G. Plyler, Sherri Haas, and
Geetha Nagarajan echoed these findings. The authors identified four major areas of economic benefit: (i) local economic expansion in terms of money circulation and local employment, (ii) physical, financial and food security, (iii) financial, human and social capital accumulation, and (iv) business environment in terms of transactions ease and quality control. (See Figure 5.)

Jack and Suri suggest that M-PESA could alter bargaining power within households or other networks. Economically weaker family members might expect larger and more regular remittances from better-off city-dwelling relatives, who find it hard to justify not sending money home. Supporting this hypothesis, Morawczynski and Pickens (2009) also find that M-PESA empowers rural women by making it easier for them to solicit funds from their husbands and other contacts in the city.

**Risk-sharing**

M-PESA can affect the ability of individuals to share risk. One of the key functions of domestic remittances is smoothing out the effect of unexpected setbacks. Life in Kenya holds significant risks, whether from extreme weather conditions like drought, serious illness, or political violence. In an economy like Kenya’s, where much of the population lives close to subsistence, the benefits of smoothing downside risks can be considerably larger than in the U.S. or other developed countries.

By lowering both the fixed and variable costs of transferring money, M-PESA helps smooth consumption more effectively by enabling a wider range of shocks to be offset by transfers in a support network, and by expanding the scope of the network involved. Because M-PESA makes remittances quicker and more accessible, help comes sooner and keeps problems from getting worse. Before mobile banking was available, the high cost of remittances tempted family members to wait for conditions to worsen to levels that ended up causing long-term damage.

Jack and Suri (2011) find that households without access to mobile money suffer a 7-10% reduction in consumption when faced with an unexpected negative income shock, but those with access to mobile money are able to smooth the effects of these income shocks completely.
When faced with a negative shock, households with access to the service are more likely to receive a remittance, receive a larger total amount, and receive from a larger fraction of their network. Jack, Stoker, and Suri (2011) show that in cases of serious illness, user households are able to raise total expenditures and finance necessary health care expenditures (most likely from remittances) without compromising other expenditures in areas like education and food. By contrast, non-users must reduce non-medical spending to accommodate the illness shock.

Growth and Evolution
In conducting two survey rounds, Jack and Suri provided an interesting perspective by comparing use of the service in its initial stages with the changes after its rapid growth. (See Table 1.)

The number of M-PESA users increased dramatically between the two survey rounds: while in 2008 less than half the households surveyed were M-PESA users (43%), by 2009 nearly 70% of households were users.

Not owning a cell phone emerged as the major constraint to adoption of M-PESA, as evidenced in the declining proportion of non-users who owned a cell phone—52% in Round 1 and 39% in Round 2.

Early adopters generally had higher levels of consumption and education levels than late adopters, and late adopters in turn had higher levels than those who never used M-PESA. The same pattern holds for possession of a bank account, and the reverse for "under the mattress" savings.

<table>
<thead>
<tr>
<th>Number of Households</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,143</td>
<td>873</td>
<td>2,016</td>
<td>629</td>
<td>1,387</td>
<td>2,016</td>
<td></td>
</tr>
<tr>
<td>Share of Total</td>
<td>0.57</td>
<td>0.43</td>
<td>1.00</td>
<td>0.31</td>
<td>0.69</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Income and Wealth**

<table>
<thead>
<tr>
<th>Annual Household Expenditure (KSh)</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>172,181</td>
<td>305,684</td>
<td>230,005</td>
<td>118,452</td>
<td>245,105</td>
<td>205,599</td>
<td></td>
</tr>
<tr>
<td>(221,960)</td>
<td>(434,581)</td>
<td>(337,712)</td>
<td>(100,437)</td>
<td>(240,852)</td>
<td>(215,626)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assets (KSh)</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>77,706</td>
<td>209,769</td>
<td>134,910</td>
<td>55,652</td>
<td>166,478</td>
<td>132,187</td>
<td></td>
</tr>
<tr>
<td>(299,111)</td>
<td>(576,102)</td>
<td>(445,713)</td>
<td>(222,091)</td>
<td>(715,700)</td>
<td>(609,538)</td>
<td></td>
</tr>
</tbody>
</table>

**Wealth Index**

<table>
<thead>
<tr>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
<th>NON-Usuarios</th>
<th>Usuarios</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.571</td>
<td>0.747</td>
<td>0.000</td>
<td>-0.929</td>
<td>0.416</td>
<td>0.000</td>
</tr>
<tr>
<td>(1.529)</td>
<td>(1.826)</td>
<td>(1.788)</td>
<td>(1.464)</td>
<td>(1.828)</td>
<td>(1.832)</td>
</tr>
</tbody>
</table>

**Other Characteristics**

- Share of households with at least one cell phone | 0.52 | 0.92 | 0.69 | 0.39 | 0.92 | 0.75 |
- Share of households with at least one bank account | 0.34 | 0.71 | 0.50 | 0.23 | 0.65 | 0.52 |
- Share of the unbanked population in each category | 0.75 | 0.25 | 1.00 | 0.50 | 0.50 | 1.00 |
- Share of the banked population in each category | 0.38 | 0.62 | 1.00 | 0.14 | 0.86 | 1.00 |
- Share of the rural population in each category | 0.71 | 0.29 | 1.00 | 0.41 | 0.59 | 1.00 |
- Share of the urban population in each category | 0.47 | 0.53 | 1.00 | 0.24 | 0.76 | 1.00 |

Note: All figures reweighted accordingly. Standard deviations in ().
Payment delays were more common in the initial stages of M-PESA, with about 20% of users reporting some kind of delay in Round 1. (See Table 2.) By Round 2, this had decreased to 16%, even though usage increased substantially between the two rounds. The rapid increase in the number of agents over the period may explain this improvement. The majority of delays in the initial stages (about 70%) were caused by the agent not having money. In Round 2, agent cash shortages only accounted for 30% of delays, while slightly over 50% were caused by the Safaricom network being down.

Users in Round 2 had a better experience with their agents, as a smaller percentage experienced problems with withdrawing or depositing money. These numbers suggest that the quality of M-PESA services improved dramatically over time, as has the general level of trust that users have in the system.

When asked how happy they were with M-PESA on a scale of 1 to 10, over half the users in Round 1 ranked it 10 and over 90% chose 8 or above. This declined somewhat in Round 2, perhaps because of higher expectations, with about 35% ranking it 10 and 88% choosing 8 or above.

**Factors of Success**

A major factor in M-PESA’s success, Mas and Morawczynski found, is the attention paid to the role of retail agents. M-PESA’s managers understood from the beginning that the success of the system centered less on the optimal management of mobile network resources than on marshaling retail agents.

This meant not only setting up and certifying the agent network, but monitoring it closely. According to Mas and Morawczynski, perhaps the single most important aspect for Safaricom to monitor is retail agent working capital—that is, whether or not agents have sufficient cash in the till to meet customer requests for cash withdrawals.

This point was reinforced in a 2010 paper on M-PESA’s outreach by Sherri Haas, Megan G. Plyler, and Geetha Nagarajan. They determined that M-PESA’s effectiveness in meeting client needs was sometimes limited by bottlenecks such as cash and electronic float shortages among agents, as well as frequent network service disruptions.

Based on the findings of Mas and Morawczynski, other lessons from M-PESA include the importance of strong branding (in this case by linking to the Safaricom brand, which was already well-known) and simple messaging for an easy-to-use service; registration that is easy and quick for customers and rewarding for agents; and simple and transparent retail pricing.

**TABLE 2**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Share of Delays</th>
<th>Reason</th>
<th>Share of Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share experiencing delays to withdrawal of money</td>
<td>Round 1: 0.20</td>
<td>Round 2: 0.16</td>
<td></td>
</tr>
<tr>
<td>Deleted sms</td>
<td>Round 1: 0.01</td>
<td>Round 2: 0.00</td>
<td></td>
</tr>
<tr>
<td>Agent had no money</td>
<td>Round 1: 0.70</td>
<td>Round 2: 0.30</td>
<td></td>
</tr>
<tr>
<td>Public holiday</td>
<td>Round 1: 0.01</td>
<td>Round 2: 0.02</td>
<td></td>
</tr>
<tr>
<td>Agent not available</td>
<td>Round 1: 0.01</td>
<td>Round 2: 0.02</td>
<td></td>
</tr>
<tr>
<td>Agent system down</td>
<td>Round 1: 0.05</td>
<td>Round 2: 0.11</td>
<td></td>
</tr>
<tr>
<td>Safaricom network down</td>
<td>Round 1: 0.11</td>
<td>Round 2: 0.51</td>
<td></td>
</tr>
<tr>
<td>No ID</td>
<td>Round 1: 0.07</td>
<td>Round 2: 0.07</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Round 1: 0.04</td>
<td>Round 2: 0.05</td>
<td></td>
</tr>
</tbody>
</table>

**Implications for Policy**

These initial studies document the significant impact of mobile banking on financial services in Kenya and present policy makers with more options to foster greater financial inclusion.

One challenge will be to integrate mobile money into the general framework of financial services, including banking. Competitors to M-PESA have sprung up and are making advances in this area, but it is likely to require further regulation by the government.

The fact that M-PESA could conceivably alter bargaining power within households may weaken incentives for rural household members to work, offsetting some of the efficiency of improved labor allocation and risk sharing.
Conversely, M-PESA could empower certain household members, particularly women, who have traditionally had less bargaining power. Remittances received via M-PESA are less visible than those transmitted by traditional means, and could put recipients in a position to keep more of the funds they receive. This, in turn, given evidence that spending patterns of women and men differ, suggests that M-PESA could have real effects on the allocation of household spending as well as patterns of saving—all of which would impact economic development. M-PESA may bring further change to urban-rural relations. On the one hand, the ubiquity of mobile phones makes it easier to stay in touch. But the ability to send remittances via M-PESA obviates the need for more frequent trips home and urban migrants are in fact returning home less frequently.

M-PESA seems to facilitate greater use of remittances among younger people and among much broader networks than the traditional channels centered largely on the parent-child relationship, and this will bear further research.

REFERENCES

Primary studies:

Additional studies cited in the text:


For related overviews, see also:

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