

*Mobile Money in the Developing World: The Impact of  
M-PESA on Development, Freedom, and Domination*

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The role of information and communication technologies in development is contested between those who believe it will facilitate broad-based human development and those who believe it is at most, impotent, and at worst, counterproductive. This paper takes a meso-level approach to specify the impact of a large-scale mobile phone-based financial service in Kenya, M-PESA. When analyzed through the related theories of freedom of Amartya Sen and Philip Pettit, the impact of M-PESA is of a dual nature. In many ways, new forms of empowerment are possible through mobile money, but adoption of the standard also leads to limitations on choice and new forms of dominance. Institutional arrangements that are most likely to minimize the trade-offs of mobile money are recommended.

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*“A small amount of gold and silver is of as great value as things cumbrous and heavy; and so peoples far distant from one another can, by the use of money, trade very easily in those things which civilized life can scarcely do without.”*

– G. Agricola (1986)

## **I. Introduction: The ICT4D Debate**

Information and communication technologies (ICTs) have enmeshed the globe in digital networks, and none is as widespread as the mobile phone, a technology with more than five billion subscriptions globally (Wireless Intelligence). Development practitioners are increasingly looking to use this pervasive device as a facilitator of broad-based human development. This paper seeks to add to our understanding of the role that ICTs have in human development through the study of a particularly acclaimed application, the use of mobile phones to deliver financial services.

Despite widespread belief that ICTs enable the development process, both theory and empirics can be marshaled by those who take an opposite approach: that the use of ICTs for development goals is, at best, impotent, and, at worst, counterproductive. The split is evident at both the macro and micro levels. For example, sophisticated macro-level regression analysis finds that “mobile telephony has a positive and significant impact on economic growth, *and this impact may be twice as large in developing countries*” (Waverman et al. 2005). An entire literature has been written about the use of ICT to reach national development goals (variously known as e-development, information societies, or knowledge economies). In

contrast, in his monumental trilogy, *The Information Age: Economy, Society and Culture*, Manuel Castells argues that instead of materially benefiting the world's poor, ICTs enable a globalization process which is inherently exclusionary of what he calls the Fourth World, a population scattered throughout the world's "black holes of informational capitalism" but united by their irrelevance to economic production (Castells 1998). As Donner (2008) notes in discussing Castells theory, "it is too optimistic to think that a rollout of [ICT] applications in the Fourth World [will] resolve [the] complex environmental and infrastructure problems completely." Indeed, after examining 20 years of cross-country evidence on the relationship between teledensity and inequality, Forestier et al. (2002) found that "historically, telecommunications rollout has had a positive and significant impact on *increasing* inequality and little impact on quality of life variables."

At the micro-level, a landmark study found that the adoption of mobile phones by impoverished Indian fishermen was "associated with a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price". As a result, both "consumer and producer welfare increased" (Jensen 2007). Welfare benefits have been found in other sectors, notably agriculture (Aker, forthcoming). Yet other research finds reasons for pessimism. For example, also studying Indian fisherman, Abraham (2008) finds that local power structures can stymie expected benefits. Instead of being able to use mobile phones to locate and sell at the best possible port, local moneylenders, who have a "chokehold

[on] the credit market” direct fisherman to ports that are less economically efficient. Similarly, in Ethiopia, the diffusion and use of ICT has been specifically designed by “local political elite” to further their interest (Gagliardone 2009). This sort of research underlines the ability of social forces to re-shape technology.

	Utopians	Dystopians
Macro	E-development, information societies, and knowledge economies (e.g. Waverman, Freschi and Fuss)	Castells’s “Black holes of informational capitalism”
Micro	Individual livelihood improvements (e.g. Kerala fishermen)	“Social shaping” (e.g. Ethiopia)

**Figure 1. Mapping the competing claims about the interaction between ICT and development**

## **II. Method: Meso-Level Specification**

The debate about ICTs and development is a subsection of a larger debate about the relationship between society and technology. As Misa (1994) notes, these disputes are often divided between those who look at “broad causal patterns” (macro) and those who examine a “tightly focused story [of] complexity and diversity” (micro). He argues that understanding the complicated interplay between technology and society requires moving beyond, or, more accurately, between, the macro and the micro framings. Meso-level approaches that examine the actors, institutions and processes that intermediate between micro (firm, individual) and macro (market, state)

are the best method toward resolving disputes such as those plaguing assessments of ICTs and development. Mansell (2002) has made a similar point and Brey (2003) writes of *specification* as a method where an abstract phenomenon is examined through the study of a specific case.

This paper takes its methodological cue from these authors and surveys a mobile money service in Kenya that serves as a mediator between individual lives and national developmental trends. The service, M-PESA, was launched by Kenya's largest mobile network operator, Safaricom, in March 2007 and allows for an increasing array of financial activities to be conducted on basic mobile phones. Although just one example of using mobile phones to delivery financial services, M-PESA is widely considered the most successful, having reached more than 13 million users in less than four years ("M-PESA Customer..."). Its success provides an opportunity to *specify* the impact of ICT diffusion in a developing country, and although different institutional contexts will interact with different technological affordances in unique ways, certain generalizable phenomenon is observable.

### **III. What is Mobile Money? The Kenyan Experience**

Although various, and at times competing, labels and definitions have been used when discussing the provision of financial services through mobile phone networks, this paper uses the increasingly popular term "mobile money" to refer to the convergence of mobile telephony and financial services. Following Heyer and Mas (2010) "mobile money" includes three

elements: 1) an electronic stored-value account linked to a user's mobile phone, 2) mobile phone software (or "application") that allows users to manage their accounts, and 3) a network of agents where users can exchange between cash and electronic value. The software can afford a variety of uses, such as the ability to check a bank account balance via text message, the means to pay with or send money from a digital account on a mobile phone, or the practice of receiving insurance or credit products over the mobile network. Assessing the diversity, Gencer (2011a) separates mobile money into mobile payments, mobile finance, and mobile banking. Safaricom's service is capable of each of these functions.

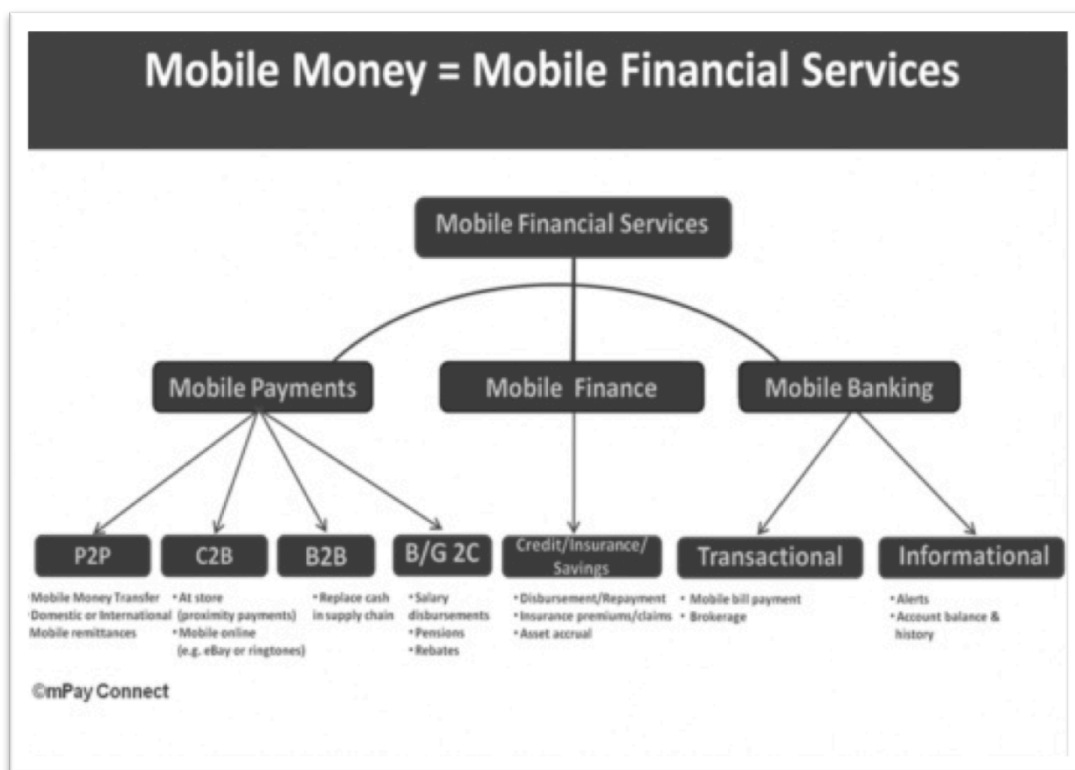


Figure 2. A typology of mobile money from Gencer (2011a)

One of the reasons mobile money has attracted considerable attention is the expectation that it can provide affordable financial services to previously excluded populations (Ivatury 2006). A considerable literature on financial inclusion emphasizes that “banking the unbanked” can lead to better decision-making, more efficient markets, and various other development goals (Collins et al. 2009). Throughout the developing world, mobile phones have emerged as one of the most widely diffused technologies; in Kenya, mobile subscriptions in 2009 were 48.65 percent of the population, up from a paltry 0.41 percent only 10 years earlier (“Mobile Cellular...”). This is a scale unimaginable for traditional brick-and-mortar infrastructure, such as bank branches.

As mentioned, M-PESA was launched in March 2007 and since then has grown remarkably. It consists of a number of interconnected systems that form the M-PESA network. The software application resides on the SIM card, a chip that identifies the subscriber’s phone number, and allows users to access various functions outlined below. The M-PESA application connects to the Safaricom network and uses the SMS protocol to communicate with the central servers (that record transactions) and other phones (such as for a peer-to-peer value transfer). A user registers for M-PESA at any one of 20,000 licensed agents. The process is free and only requires the customer’s name, government ID number, date of birth, occupation, and mobile phone number (Mas & Radcliffe 2010). If the customer has an older SIM card, it is swapped for one that supports M-PESA, but their phone number remains the

same. In the same interaction, the customer chooses a secret PIN and the retail agent explains how to use the application and the cost structure.

Once registered, users have a variety of options. When launched, M-PESA had three features: users could deposit or withdraw cash at agents, transfer money to another M-PESA account, or buy prepaid airtime. The minimum deposit is US\$1.25, but there is no fee and no minimum balance.<sup>1</sup> Deposited cash is equally denominated in its digital, M-PESA equivalent, 'e-float', and customers can check the balance on the mobile phone.

M-PESA charges for cash withdrawals and for sending money to another user (via SMS), with the fee increasing for larger valued transactions. Additionally, users are able to send value to non-users who can then withdraw the received amount without charge; however, the sender is charged a significantly higher fee if the recipient is an unregistered user.

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<sup>1</sup> As of April 2011, the exchange rate was USD \$1 to \$83 Kenyan Shilling.

TRANSACTION TYPE	Transaction range (KShs)		Customer Charge (KShs)
	Min	Max	
<b>Value Movement Transactions</b>			
Deposit Cash	50	70,000	Free
Registered User Cash Withdrawal	50	100	15
	101	2,500	25
	2,501	5,000	45
	5,001	10,000	75
	10,001	20,000	145
	20,001	35,000	170
	35,001	50,000	250
	50,001	70,000	300
Unregistered User Cash Withdrawal	100	35,000	0
Cash transfers to registered users	50	100	10
	101	35,000	30
	35,001	70,000	60
Cash transfers to unregistered users	100	2,500	75
	2,501	5,000	100
	5,001	10,000	175
	10,001	20,000	350
	20,001	35,000	400
ATM Withdrawal Charges	200	2,500	30
	2,501	5,000	60
	5,001	10,000	100
	10,001	20,000	175
Buy airtime (for self or other)	20	10,000	0
<b>Information Transactions</b>			
Change PIN			20
Show balance			1

Figure 3. M-PESA Tariff Structure (Source: <http://www.safaricom.co.ke>)

Like other mobile network operators in the developing world, Safaricom maintains a large network of retail agents who sell prepaid airtime to customers. This existing network formed the basis for the M-PESA agents who serve as cash-in and cash-out locations for M-PESA users. In time, additional businesses, such as banks, gas stations and supermarkets, have

become M-PESA agents, such that there are now 20,000 throughout Kenya. Except for large businesses, new agents must have three locations that have been established for at least six months. These retailers accept standardized M-PESA branding, auditing, and provided equipment to facilitate the business (“M-PESA Agent...”). According to Haas et al. (2010), the minimum startup cost is around US\$1,333.

When launched, M-PESA was not a bank and was not regulated as such. Nor did it provide interest on e-float.<sup>2</sup> However, when users were surveyed 18 months after launch, 75 percent of users report saving in their M-PESA account; 21 percent said it was their most important savings mechanism and fully 90 percent said it was amongst their three most important savings mechanism (Jack & Suri 2011). The amount of money stored digitally in the M-PESA system, therefore, was not insignificant. According to an agreement with national regulators, this money was held in bank accounts at major Kenyan financial institutions, and the interest Safaricom accrued from those holdings was placed in a trust whose purpose is yet to be decided.

In time, M-PESA has included features in addition to peer-to-peer transfers. Besides being used for domestic remittances, money can be sent and received from partners in the United Kingdom. M-PESA can be used at major supermarkets or to purchase event tickets. Customers can pay bills

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<sup>2</sup> In an economy where consumer price inflation frequently reaches into the double digits (peaking at 26.2 percent in 2008), this is significant. (World Bank Data).

and receive corporate payments (such as salaries) using the service. And, most notably, in May 2010 M-PESA partnered with Equity Bank to create M-KESHO, an interest paying bank account that resides in parallel on the M-PESA SIM card. M-KESHO also allows for micro-credit and insurance products, moving significantly towards the promise of “banking the unbanked.” Like M-PESA, M-KESHO registration is free and accounts have neither monthly fees nor minimum or maximum balances.

Safaricom is not alone in offering mobile money in Kenya. The other three mobile network operators in Kenya have launched mobile money services, as well. The second largest MNO, Airtel (previously Zain), which has a little less than 20 percent of Kenyan mobile phone subscribers, launched a mobile money service two years after Safaricom, in early 2009; it was subsequently followed by the smaller operators, Orange and Yu, in late 2009 and 2010, respectively. Despite some initial adoption and lower prices, none of the alternatives have captured the market or mind share that M-PESA has.

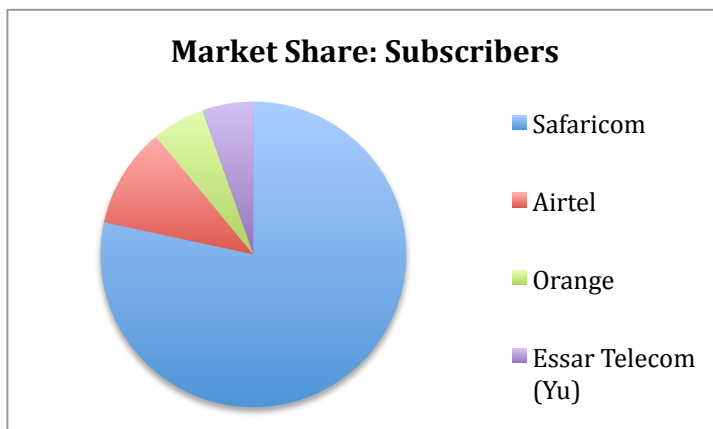


Figure 4. Kenyan mobile subscription market share (Source: <http://bit.ly/dTz9Sr>)

#### IV. Evidence of the Development Impact of M-PESA

As with other information and communication technologies, mobile money has been perceived as a technology with a strong proclivity to provide beneficial development impacts. *The Economist* thought it “like magic” (“Out of...”). Others find it “transformational” (Coyle 2007). Major foundations and donors have buoyed it. Yet, the literature on the development impact of mobile money remains more anecdotal and speculative than large-scale and rigorous. This criticism has been made before and is largely understandable given the novelty of mobile money and the difficulty of ascertaining specific causality (Donner & Tellez 2008), but one aim of this paper is to provide theoretical framing through which impact might be better assessed. In this section the literature on the impact of mobile money, especially M-PESA, is reviewed.<sup>3</sup> As a general reflection not much has significantly changed from when Duncombe and Boateng (2009) surveyed the literature on mobile phones and financial services in developing countries and found little application of conceptual or theoretical approaches and more practitioner surveys than academic research. That said, there have been additional impact assessments and large-scale research has been produced in the intervening years. What follows has been summarized in Appendix A.

Beginning in 2000, mobile phone networks began to be used explicitly as a platform for the delivery of financial services. An early report from

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<sup>3</sup> Others have studied the need for mobile money, its design, and its adoption, but in keeping with the scope of this paper, this literature review has, to the extent possible, confined itself to studies that assess the impact.

Wishart (2006) provides a survey of “mobile-enabled commerce (m-Commerce).” Though it mentions four smaller African systems - MTN Banking (a joint venture between South Africa’s Standard Bank and the mobile operator, MTN), and CelPay (a system developed by Celtel but owned by First Rand Bank of South Africa), Fundamo (a South African m-commerce software provider), and M-PESA (then just a trial application in Kenya), – the focus of the study are two established mobile money applications in the Philippines, SMART Money and GLOBE G-Cash. At the time of the study, the two services had a combined 3.5 million users who were primarily attracted by the ability to buy prepaid airtime and transfer money to peers. The mobile network operators offering the services found that average revenue per user increased because the mobile money offering used SMS, and customers became markedly more loyal to their provider, “with one measure suggesting churn<sup>4</sup> dropped from 3 percent per month to 0.5 percent per month.” Customers used the system for around two transactions per day with average values between US\$15 and US\$30. The report suggested that “if implemented properly, the service would bring advantages to all stakeholders,” including easier transactions, higher revenue, new customers, better taxation, and more profitable allocation of previously ineffectively invested capital.

Ivatury (2006) assessed 62 banks and microfinance institutions (MFIs) using ICT to deliver financial services to poor people. Of these, only

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<sup>4</sup> Churn refers to subscribers who change to a different mobile network operator.

ten were using mobile phones, as opposed to ATMs or point-of-sale terminals. Providers were motivated to use ICT by a desire to improve customer convenience, lower processing costs, and increase coverage, revenue and holdings. However, a paucity of data made it difficult to ascertain if poor and remote populations were benefiting and, if so, to what degree. Importantly, Ivatury linked mobile money explicitly to a significant and well-established literature on the impact of financial inclusion.<sup>5</sup>

In South Africa, a mobile money pioneer, Ivatury and Pickens (2006) surveyed 515 low-income individuals, 215 of whom used WIZZIT, a mobile banking service, and 300 of whom did not. The authors note that the sampling methodology had a number of weaknesses, but as an exploratory study, the results can be considered indicative. Customers lauded WIZZIT for its convenience, accessibility, and affordability. "A WIZZIT account is as much as one-third cheaper as an account at one of South Africa's big retail banks for the same basket of services." However, the very poor were not using mobile money due to expense, lack of awareness, complexities of the technology and a belief that the service was not appropriate for them. Therefore users tended to be wealthier than non-users, and more employed, disproportionately male, and better educated.

More recent analysis of the pricing of mobile money corroborates the reduced costs. In an international comparison of the cost of 16 branchless banking operations (including mobile money) against 10 traditional banks

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<sup>5</sup> For a recent review, see Ardic, Heimann and Mylenko (2011).

targeting the poor, McKay and Pickens (2010) found that branchless banking was 19 percent cheaper on average. At low transaction amounts, the difference is even higher, at 38 percent. It is also 54 percent cheaper than informal money transfer options. In Kenya, low-income households spend 0.04% of their GDP share on branchless banking compared to 0.07% on average, and M-PESA is routinely one-third to one-half cheaper than even these alternatives.

Using national data from South Africa, Porteous (2007) asks if mobile phones have actually extended the “access frontier,” an approach that assesses the accessibility of a service by segmenting the market into various populations. In 2006, there were around half-a-million mobile money users in South Africa, but most of those were “additive,” meaning that mobile money did not substantially expand access to formal banking to those previously excluded. Instead, a non-technological means, namely the Mzansi class of bank accounts targeted at the poor, were found to have led to more than 1.2 million people becoming banked. Given the available evidence, the author argued that mobile money was not “transformational,” meaning it did not provide banking services to the previously unbanked. Despite the lack of mobile phones banking the unbanked at that time, the proliferation of mobile phones suggested “that the *future* access frontier may indeed be shifting outwards”, but Porteous argued that product offerings and policies would need to nurture this.

Williams and Torma (2007) provide additional theoretical and anecdotal evidence of the impact of mobile financial services. They argue that access to banking has a two-fold impact on low-income households. In the first step,

the benefits of access to finance are exclusively improvements in the quality of people's lives, such as saving time, reducing the threat of crime, and making transactions easier. The subsequent rungs of the ladder introduce additional benefits which flow from establishing financial track records.

These financial records reduce informational asymmetries, allowing beneficial financial instruments that include debt financing (such as mortgages), and long term savings products (such as pensions). Although researchers have yet to be able to systematically document the relationship between mobile money and more sophisticated financial products, anecdotally, they can point to improvements in the quality of life arising from the use of mobile money. The authors give the example of South African farm workers who previously had to travel for hours, spending considerable sums, to purchase airtime, but can now do so "for less than 1 Rand and eliminate all the travel time."

Ivatury and Mas (2008) provide additional evidence about the early uses of mobile phones as financial service platforms. Cost reduction, which can be passed on to the user, is a major benefit. In the Philippines, "a typical transaction through a bank branch costs the bank US\$2.50; this would cost only US\$0.50 if it were automated by using a mobile phone." In Pakistan, Tameer Bank estimated that opening a bank branch in a Karachi slum would

cost thirty times what a retail agent would cost, and monthly operating costs would be US\$28,000, compared with US\$300 for an agent. Despite the lower costs and higher availability, the authors estimate that “less than 10 percent of all branchless banking customers are poor, *and* new to banking, *and* are using these channels for financial services” other than paying bills, purchasing airtime, or receiving government payouts. Most usage is for payments, as opposed to savings or credit, and the authors argue this is due to a combination of advertisements and perceptions that are both biased towards payments. Echoing Ivatury and Pickens (2006), the authors estimate that fewer than one-tenth of South Africa’s one million mobile banking customers are below the poverty line, suggesting that this private enterprise was having difficulty assisting the development of those at the “bottom of the pyramid” (Prahalad 2005).

It seems that despite assertions that ICT can do more for the poor than the wealthy (Bayes 2001), any impact of mobile money at the early stages has been nearly exclusively felt by adopters who tend to be wealthier and more educated. In time, though, some observers have argued that “the introduction of mobile banking services is having, and will continue to have a disproportionately positive impact on the poor compared to their wealthier counterparts” (Chipchase 2009). As Donner and Tellez (2008) caution, though, understanding the true impact of mobile money on the lives of the poor will require understanding actual usage behaviors.

One such example linking usage, adoption and impact is Walia and Goodman's (2007) study of the social and economic impacts of Vodafone Egypt's balance transfer service (BTS). BTS is a product that allows Vodafone customers to share airtime by transferring it amongst themselves for a small fee. In addition to company data, the researchers conducted focus groups, interviews and a nationally representative survey of 700 BTS users and 300 non-users. Forty-five percent of customers had used the service in its two years of existence, transferring nearly US\$9,000 worth of airtime in 4,400 transactions in July 2006 alone. However, use was not frequent, with heavy users only sending and receiving airtime, respectively, 7 to 10 times in a three-month period. Despite that, the researchers argue that the service increased access to mobile telephony and the affordability of airtime. Additionally it created commercial opportunities for entrepreneurial customers who derived a supplementary source of income from use of BTS. The system also supported existing social networks by enabling a gift economy to develop (Mauss 1976; Hyde 2007). Finally, the study contested the hypothesis that "airtime has the potential to become a proxy or virtual currency." Despite having the characteristics of money – medium of exchange, store of value, and unit of account – the cost of BTS and significant cultural barriers limited its use as currency.

Vodafone Egypt's balance transfer system, and similar services in other countries, was inspired by informal practices. Chipchase and Tulusan (2007) document many of those practices, noting that they, like mobile

money, are embedded in milieu thick with cultural and social norms. Most relevant is *sente*, the practice of buying prepaid airtime but instead of adding it to one's own phone, calling a distant phone kiosk operator who, for a commission of 10 to 30 percent, passes the balance onto a desired recipient in the form of cash. The airtime that remains is then sold for a profit. The researchers note that *sente* works because it is profitable, saves time and money, requires minimal infrastructure, is convenient, and is largely secure (though they note the potential for new types of fraud).

M-PESA, of course, mirrors *sente* and builds upon the existing practices of Kenyans, including sending money from urban to rural areas. Drawing on a large literature that emphasizes the importance of domestic remittances to the social and economic livelihoods of low-income Africans (such as through supplementing rural income, stimulating local demand, and reinforcing social capital), Morawczynski (2008) documents the ways that M-PESA is facilitating remittances and, in doing so, "radically changing the way that migrants in Kibera remit money back to the rural." Ethnographic work in Kibera, a large informal settlement in Nairobi, found that while some money was sent for political or business interests, the vast majority of users were using it as advertised, to "Send Money Home." Most users surveyed did so at least once a month and claimed that they would do so for as long as possible. Additionally, Safaricom's mobile money service was also being used to store money, "even if they already had a bank account." This was because M-PESA was less risky than cash and more convenient and trusted than banks (none

of which had a branch in Kibera and many of which were considered prone to tribal bias). Although widely considered faster, cheaper, and more convenient than alternative remittance methods, M-PESA was not being used for all remittances; this was because in-kind remittances were still sent and technical difficulties sometimes plagued Safaricom's network.

In another publication, Morawczynski (2009) writes that M-PESA is used for "livelihood strategies" and that such "strategies helped residents to cope with (temporarily adjust) and recover from (longer term shifts in livelihood strategies) stresses and shocks." This study is based on the previous ethnographic mixed-method surveys in Kibera with additional work in the village of Bukura in Western Kenya. Remittances via M-PESA were found to typically flow from urban to rural, with peaks during planting (when farming inputs were needed), harvest (when additional labor was needed) and the so-called "hunger season" (when food stocks run low). However, the study also captures a reversal in the direction of remittances during the post-election violence of late 2007 and early 2008 when Kenya's urban areas were paralyzed by riots and M-PESA "became one of the only means through which they could access cash, especially during periods of escalated violence." The study also documented how M-PESA impacts remittance behavior: with smaller fees and greater ease, M-PESA users began to remit smaller amounts, but more often, so that an increase of 20-40% was noted. Additionally, less travel meant less expense in sending and receiving money. Individual autonomy has increased, too: women spoke of personal, "secret"

savings that allow them to make decisions without seeking permission from their husbands.

In the same article Morawczynski writes, “the most significant of the outcomes generated by M-PESA usage was a reduction in vulnerability.” This happened through the solicitation of financial capital (i.e. generating additional income through remittances and less travel costs) and the maintenance of social networks (i.e. sustaining and growing valuable social capital between rural and urban areas). However, as the author points out, the impact is not fully positive. Urban migrants received more demands for their limited income, straining social networks. Furthermore, because they had less of a need to travel home with money, some women expressed concern “that if their husband decreased the number of home visits they would become “lonely” and find a “city wife”. The outcome of this, the woman explained, could be the reduction or elimination of money sent back home.”

In a publication for CGAP that relies on the same research, Morawczynski and Pickens (2009) provide additional data from the 14 months of ethnography in Kibera and Bukura that included 350 interviews, 21 focus groups, and month-long financial diaries of 14 frequent M-PESA users. In a sample of 70 rural households, 77 percent reported an increase in income after adopting M-PESA; for 38 of these 54 respondents, the increase was 5-30% of household income. In a situation where remittances constituted 70 percent of households, this is a considerable change. According to this report, nearly one-third of already banked customers in

Kibera keep a balance in M-PESA due to ease of access, but this was viewed as a shorter-term savings account, likely because it does not offer interest. One-fifth of the unbanked in Kibera use M-PESA as a substitute for informal methods of saving, especially keeping money at home. The report also emphasizes that M-PESA is being used in conjunction with other savings methods such as bank accounts, informal savings clubs, and keeping money at home; this is done to diversify risk.

Informal surveys by Rutherford (2010) also emphasize the use of M-PESA for informal financial services. The ease and low cost of M-PESA have facilitated informal borrowing, perhaps even boosting it because it is so reliable. Wilson, Harper and Griffith (2010) also observe informal savings groups using M-PESA for transfers. Reflecting, Rutherford writes, "With such a strong boost to its effectiveness, informal finance looks to have many thriving years ahead of it in Kenya."

Although most of the research on mobile money's impact has been focused on the largest deployment, M-PESA, some attention has been placed on other initiatives, such as the Filipino cases mentioned above. Pickens (2009) synthesizes the results of a March 2009 survey of 1,042 formally unbanked consumers split between mobile money users and nonusers. They found that one-half of mobile money users (defined as those who had used SMART Money or G-Cash in the past three months) did not have bank accounts and 26 percent were below the poverty line. The average revenue for mobile money users was 40 percent higher than nonusers and they were

far less likely to change mobile operators. Intensive users were 40 percent more likely to live within five minutes of an agent. One-tenth of users saved a sum that equaled one-quarter of their family savings, or US\$31 on average.

Beyond saving, unbanked mobile money users reported sending money (50%), receiving domestic remittances (40%), buying airtime (23%), receiving international remittances (15%), receiving salary (5%) and receiving payments (2%). In addition to noting a significant portion of Filipinos who report disinterest in trying mobile money – seemingly limiting its developmental impact – customer usage is not terribly frequent:

Most active users (52%) access the service twice a month or less. However, there is a significant group (40%) of high-intensity users who do more than four transactions per month. They are 50 percent more likely to live outside urban areas, and they are 20 percent more likely to have a full-time job, suggesting that mobile money has gained traction with customers who (a) are breadwinners for their families, (b) do not have a bank account, and (c) have a need for remote payments because they live outside of cities. There is also a “super-user” group in which 1 in every 11 active unbanked mobile money users does more than 12 transactions per month.

By far the most comprehensive quantitative research on mobile money has been directed at M-PESA. Eighteen months after its launch, in September 2008, Jack and Suri (2011) conducted a survey of 3,000 randomly selected households from a population that included 92 percent of Kenya’s population and 98 percent of M-PESA agents. Before elaborating on the collected data, the authors suggest possible economic impacts of M-PESA: 1) M-PESA could facilitate trade through lowering transaction costs; 2) it could increase net household savings by reducing losses from events such as theft;

3) by deepening the person-to-person credit market, M-PESA could improve the allocation of savings and thus increase the average return to capital; 4) by easing money transfers, individuals could more easily relocate to find jobs, thus improving the allocation of human capital; 5) M-PESA could improve risk sharing, though distance could also lead to moral hazard; 6) emergency mobile money transfers could mitigate negative shocks more effectively; 7) more effective risk management could allow for better investment decisions; 8) individual bargaining power within households could change, perhaps leading to improvements in women's spending (Chattopadhyay & Duflo 2004); and 9) enhanced remittances could weaken the incentive for rural households to work or innovate, "offsetting some of the efficiency-enhancing benefits of improved geographic labor allocation and risk sharing" (Jack & Suri 2011). The researchers note that these questions are not currently resolved but that future work will explore them.

The data from this representative survey, though, does provide a comprehensive look at M-PESA. Forty-four percent of households had a member who used M-PESA at least once, but these households had expenditures that were 67% higher and had 21% more assets than non-users. In addition to wealthier, users' households were much more likely to own a mobile phone, typically better educated, and individual users were disproportionately male. They were also more likely to own stocks and have a bank account. M-PESA was popular amidst remitters, with users being much more likely to send or receive remittances than nonusers. Individuals

using M-PESA for remittances were more likely to send to a diverse network. In addition to sending money, three-quarters of households with an M-PESA user reported using it to save, with 21 percent calling it their most important savings instrument and a full 90 percent placing it amongst the three most important. Users also report finding it useful in the case of emergencies. Delays, though frequent, were usually resolved within the day. In general, M-PESA was faster, cheaper, more reliable, and safer than alternative financial mechanisms. Popular opinion regarding M-PESA, then, was overwhelmingly positive with “a very large majority report[ing] that they would suffer significant consequences if it were shut down.”

A little more than a year later Jack and Suri (2011) updated their survey, finding that 70 percent of households were now M-PESA users. “While M-PESA use was originally limited to the wealthiest groups, it is slowly being adopted by a broader share of the population.” Yet, they note that the poorest Kenyans were still excluded, likely because not owning a mobile was a major constraint. The portion of M-PESA users without a bank account doubled to 50 percent and rural users jumped from 29 percent to 41 percent, meaning that the unbanked and rural citizens were adopting it. The authors write,

A clear pattern emerges where the early adopters generally have higher consumption and their household heads have higher education levels than the late adopters, and the late adopters in turn have higher levels of consumption and their household heads higher education than those who never used MPESA. The same pattern holds for possession of a bank account, and the reverse for using a mattress for saving. This is further evidence that the earliest MPESA users were the

wealthiest and most educated, but that over time, it is being adopted by people of more varied socioeconomic levels. The non-users, however, remain the least well off and least educated group.

The split between user and non-user remittance patterns, though, became more pronounced as remittance senders and receivers joined the M-PESA network and non-users tended to be those who do not remit. M-PESA households tend to be remitting more frequently, but in contrast to Morawczynski (2009) the “total amount [M-PESA users] sent and received is not very different from the average household.” M-PESA was certainly becoming a preferred way to remit, as M-PESA users sent about 75 percent of remittances via the M-PESA network, as opposed to about half of their remittances the year before. The value of these remittances, though, was generally smaller than remittances using other methods. The authors also speculate that “M-PESA users have and/or take advantage of much broader networks than non-users” though defer the conclusion for later study. Besides sending money, M-PESA was also used by 81 percent of users for savings, and a dramatic increase in households reported using M-PESA in emergencies (from 12 to 22%). Users remain very happy with the service, and 92 percent would expect a large and negative effect from M-PESA shutting down. As for nonusers, one-third more said they did not need M-PESA than in the previous survey, suggesting that the amount of those who feel they need M-PESA but cannot access it is lessening. However, 60 percent of nonusers cited not owning a mobile phone as the barrier to adoption.

Additional user perceptions are captured in mixed-method survey by Plyler et al. (2010) that focused on the “communitywide effects caused by the presence and use of M-PESA for all residents in the community.” Results from surveys, focus-groups, and case studies in two rural town centers and Kibera indicate that M-PESA is having a wide variety of impacts on local economic expansion, security, capital accumulation, and business environment. Although “effects were not visible in all the study communities and among all the population segments within the communities”, respondents reported that increased money circulation, improved transactional ease, and enhanced money security were the top three perceived effects of M-PESA (followed by impact on food security, human capital accumulation, expansion of businesses, social capital accumulation, employment opportunities, financial capital accumulation, physical security, and quality control.) The research found that 80% of rural market vendors surveyed use M-PESA and 60% of it is for business uses. Yet, the reported effects are those that are perceived, not empirically tested, and as the authors note, “examining the net effects... and relative magnitudes of identified effects was beyond the scope of the study.” However, the reported perceptions do not significantly contradict other evidence available about the impact of M-PESA. In fact, not all effects were necessarily positive; for example, it was not clear what directional impact was felt on social and financial accumulation, likely because the authors write, “It is important to note that M-PESA itself is not creating community effects, but is facilitating an environment that can produce (and multiply)

ample outcomes at the community level.” This echoes Toyama (2010) in emphasizing that technology amplifies, instead of transforms, human intent.

In a study by the same authors, Haas et al. (2010) investigate the growth of the agent network. Most agents were found to be successful businesses prior to M-PESA and to have used informal or self-financing to acquire the minimum US\$1,333 investment needed to open as an M-PESA shop. These agents had started to see the number of new registrations per day decrease over time, yet difficulty was still reported about managing liquidity. The impact of the trouble balancing cash and e-float reserves created a situation in which it “was not uncommon for a person running the M-PESA till to mitigate this problem by limiting the size of withdrawals or deposits” – a practice not allowed by Safaricom and one that creates a less straight-forward customer experience. However, Jack and Suri (2011) find that delays from liquidity shortages or for other reasons were resolved within the day in 81 percent of cases.

Gencer (2011a) explores the mechanisms through which mobile money, especially M-PESA, could positively impact the real GDP of developing countries. The author identifies five drivers of economic growth emanating from mobile money. The first derives specifically from the pervasiveness of mobile phones: previously unreachable individuals are incorporated into a data transmission network that can significantly lower costs of service provision, including financial services. Secondly, mobile money is a new industry that attracts investment, creates new jobs and

builds revenue. In Kenya, Safaricom believes M-PESA has created 36,000 new jobs. Next, mobile money is a foundational platform upon which other businesses can build; the author points to the use of M-PESA to launch low-cost insurance schemes and Gencer (2011b) identifies various means via which mobile money can enable healthcare delivery. The fourth effect of mobile money on GDP is the formalization of financial practices. Whereas billions of dollars today are “invisible” to GDP accounting, due to their unregulated and informal nature, this study echoes de Soto’s (2000) expectation that formalization can lead to growth. Finally, mobile money can improve economic growth through reducing inefficiencies such as travel time, the risks of carrying cash, and the inability to trace cash. Unlike cross-country regression analysis linking ICT diffusion or investment to faster economic growth, this study does not provide statistical analysis, but it does provide an overview of how such relationships would be developed.

### **Conclusion**

Previous reviews of the literature on mobile money and branchless banking have come to similar conclusions. As Dermish et al. (2011) write, there is a “blossoming literature, which is long on vision, hypotheses and anecdotal evidence.” Likewise, Duncombe and Boateng (2009) note an overemphasis on market-led mobile money, a general lack of theory, and a narrow geographical representation. These weaknesses remain. Of further note is the relative lack of systemic assessment.

Additionally, in reviewing the development impact of mobile money, two characteristics of the literature are especially relevant: the relatively small community of interconnected development practitioners that have authored the reports, and the still emerging nature of mobile money in the developing world. Both elements contribute to the relative homogeneity of approaches and results that typify the reviewed literature. Because mobile money is such a new phenomenon, and because it has not yet been evaluated from a wide diversity of approaches, the literature on mobile money tends to be descriptive and celebratory. This is not to say that the available research has been flawed; most studies are reliable and document important details, and the practitioner insights are invaluable, but robust consensus only emerges from a diversity of views and tactics. Like societies, mobile money needs dissent (Sunstein 2003).

## **V. Networks and Network Power**

In recent decades, networks have become a defining organizational structure (Barabási 2003). Although networks have existed throughout history, the growth of ICT and globalization has brought networks to new prevalence and scale. Attention has been placed on the role of networks in fields as diverse as economics (Benkler 2006), sociology (Wellman 1999), and politics (Mueller 2010). Manuel Castells (1996-1998) has even influentially defined modern society as *the* network society.

Given the breadth of their application, definitions of networks differ, but the root comes from the mathematics of graph theory. In this methodology, elements are reduced to nodes and links. Entities, whether they are companies or terrorist cells, are conceptualized as nodes that are interconnected through links of various kinds. For example, Al-Qaeda might be considered a global network of terrorists linked by arms trafficking or financial flows.

M-PESA, too, is a network in the sense of “an interconnected group of people linked to one another in a way that makes them capable of beneficial cooperation which can take various forms, including the exchange of goods and ideas” (Grewal 2008). Like other networks, M-PESA is interconnected via a standard - defined as a “shared norm or practice that enables network members to gain access to one another” - and it most prominently takes the form of SMS value transfers or deposits and withdrawals at highly standardized retail agents. For the network of M-PESA, individual agents are linked by mutual super-agents and to customers who are linked via remittance transfers to family.

Conceptualizing M-PESA as a network brings into focus varying characteristics that are found across networks. One defining feature of networks is the increased value that comes from additional nodes. This form of positive externality is called a network effect, and the phenomenon is frequently illustrated by the example of a fax machine: while the first fax machine is largely useless, its value grows as additional fax machines join the

network. M-PESA, as a network that unites agents, customers and businesses, also realizes network effects. In fact, it is a primary contention of this paper that factors associated with the growth of M-PESA are important insofar as they advance the network effects accumulating to the M-PESA standard.

Another characteristic of network standards is that they tend to “eliminate alternative standards that might have been freely chosen” (Grewal 2008). As new users join a network, the network they leave becomes less valuable, sometimes being caught in a negative feedback loop. This phenomenon has been identified in various information-based contexts (Shapiro & Varian 1999), including those of operating systems, social networks, and the Internet more generally (Boyd 2010).

David Singh Grewal labels the union of network effects and the subsequent elimination of alternative standards as “network power”, a phenomenon he examines in detail in his 2008 book, Network Power: The Social Dynamics of Globalization. In it, he explores how the choice between competing standards is one with implications for power, freedom and individual choice (terms that will be defined more closely below). Because a growing standard can be driven by a positive feedback loop in which its value increases to the detriment of other standards, some networks will be deserted while others become dominant. After all, who today uses a fax machine?

The adoption and diffusion of a technological standard is always a complex phenomenon (Rogers 2003), but Grewal (2008) distills the drivers

of adoption into three categories: reason, force, and chance. As with other standards, M-PESA was adopted at various times due to the interplay of these three factors. The next two sections will first generally define reason, force, and chance and then discuss the rise of M-PESA specifically within this framework.

### **The Adoption of Standards**

In the adoption of a standard, *reason* refers to the capacity of a standard to satisfy better than alternatives “the goals that an agent has when entering into a cooperative agreement.” Given a choice of standards by which to communicate with others, people will use logic to consider and make judgments about their options. Their rationale can either be *intrinsic*, meaning it derives from characteristics inherent to the standard, or *extrinsic*, meaning its attractiveness comes from the size of the network it unites. It may be that the design of a given standard is logically more appropriate for the individual than others; these are intrinsic reasons. Alternatively, it may be reasonable to adopt a standard because it allows for communication with many more people than alternatives; this can make perfectly good sense, too, but is extrinsic to the standard itself. With all standards, intrinsic reasons for adoption will be relatively more important at earlier stages when it is small, but as the network grows, extrinsic reasons will supersede those inherent to the standard.

Like reason, Grewal separates *force* into two types. *Direct* force involves imposing “costs” such as violence or other punishment upon those

who fail to adopt a given standard. Direct force may also involve “denying benefits unrelated to the immediate standard-governed activity” (Grewal 2008). In this case, adoption is not driven by reason, but by coercion. As an example, Grewal points to colonial laws that banned indigenous languages in favor of the colonial tongue. Here, natives were not joining the linguistic standard because they found it to meet their needs better than alternatives, but because they faced punishment for non-membership. *Indirect* force, on the other hand, is the opportunity cost that arises from non-membership in a network. In this incarnation, compulsion is less directed and instead emerges from the adoption by others of a standard. Non-adoption results in lost opportunities to coordinate with those using the given standard. Although indirect force is not the typical conception of force, it is an imposition that can compel adoption. For example, consider the adoption of local language by immigrants who would otherwise face significant lost opportunities to participate in economic or social life in a new country.

The final factor in the adoption of a standard is chance, defined as “accidental convergence” on a standard (Grewal 2008). If it is particularly potent, a standard may be adopted that is purely arbitrary; more likely though, chance will be just a part of a standard’s adoption, interacting with reason and force. At different times, they will be variously potent, but the key is that at a certain point, the driving force is network force.

Grewal writes that “at the highest levels of network power” extrinsic reason and indirect force merge. This is a form of power because while it is

reasonable “to adopt a dominant standard rather than lose access to others... this reason dictates a selection that, while rational, is chosen under the compulsion of having no viable alternatives.”<sup>6</sup> So while adopting a standard may be reasonable, it is “a matter of semantics whether we should best describe the situation as determined by “reason” or determined by “force.” The crux of considering network power as *power* “is that beyond a certain point, members of a small network are “forced” to adopt the standard of a dominant network or else face isolation.” Grewal explains that there is “equivalence” between indirect force and extrinsic reason, and that “intrinsic reason becomes irrelevant and direct force unnecessary once a standard has surpassed a critical threshold and its continued rise is driven by network power.” In these scenarios, users face very high costs of switching between standards, often known as “lock-in” (Shapiro and Varian 1998; Mueller 2010).

## Why Standards Are Adopted

REASON		FORCE		CHANCE
Intrinsic	Extrinsic	Direct	Indirect	--

Figure 5. Grewal’s framework for standard adoption

Most analysis of M-PESA has focused on the intrinsic reasons for its adoption, instead of extrinsic reason, indirect or direct force, and chance. Thus, researchers have privileged the standard’s inherent qualities over other factors in explaining its adoption. This is sensible for two reasons. For

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<sup>6</sup> The emphasis on no viable alternatives is an important one, discussed below.

one, M-PESA is only a few years old, and intrinsic reason is relatively more important in early stages of a standard's growth. Additionally, as discussed below, there are very good intrinsic reasons to adopt M-PESA. However, there are other reasons for adopting M-PESA, and more attention should be given to them, especially given the implications for power, freedom and individual choice that large-scale standards have.

In the next section, the rise of M-PESA is considered through the lens of Grewal's tripartite framework before discussing the findings in light of development theory.

### **The Role of Reason, Force & Chance in the Adoption of M-PESA**

#### **Intrinsic Reason**

Because M-PESA is relatively new, intrinsic reasons to adopt the standard have been preeminent. M-PESA is a prominent example of "leapfrogging" where low-income countries, typically conceived of as passive recipients of technology, are actually on the cutting-edge globally due to a lack of legacy hindrances. Mobile phones in general are seen as holding "particular promise and importance as a "leapfrogging" tool due to the relatively low costs of infrastructure rollout, ease of use, the availability of inexpensive phones, and flexible subscription plans" (Andjelkovic 2010). In fact, these characteristics of mobile phones have done much to overcome the digital divide and are considered an "appropriate technology" for developing countries (Harvey & Sturges 2010).

The digital divide is more than simply a lack of technology; it is a “complex and dynamic phenomenon” (van Dijk & Hacker 2005) that occurs at various levels (van Dijk 1999). Access to technology occurs at 1) psychological, 2) material, 3) skills, and 4) usage levels. A paucity of interest in, fear of, or repulsion by technology constitutes psychological barriers to adoption. A lack of possession or shared access to devices or connectivity can be a material barrier. Even potential users, who have an interest in and possession of a technology, may lack digital literacy; or, insufficient user-friendliness can form a skills divide. Finally, without significant opportunities to employ technology, a barrier to usage will exist. Qualities inherent in the M-PESA standard have done much to overcome these various hurdles.

### ***Psychological Access***

The proposition of M-PESA is bold. Safaricom asks would-be customers to surrender their cash for what amounts to a digital promissory note. Even more, as a completely new service category, M-PESA adopters had no experience with this form of transaction. For the poor, who compose a substantial portion of the customer base, even small amounts of money matter, so Safaricom needed to establish and maintain high levels of trust in the M-PESA standard.

M-PESA has overcome these psychological barriers through a variety of strategies. As a Safaricom product, M-PESA benefits from widespread existing trust in Kenya’s largest mobile network operator. Safaricom is seen as a national company, instead of a tribal one, thereby being above the kind

of political maneuvering that many Kenyans distrust. Safaricom also took explicit steps to build trust in M-PESA. All M-PESA stores are similarly branded in “Safaricom green” and agents are trained and regularly audited to ensure reliability and consistency of customer experience (Mas & Radcliffe 2010). All transactions result in an immediate confirmation SMS, and the deposits or withdrawals that are automatically archived digitally, are also recorded in a paper ledger because many customers are more comfortable seeing the record keeping (Mas & Morawczynski 2009).

Finally, M-PESA as a standard benefited because poor people often consider alternative financial standards, such as formal bank accounts, uncomfortable (Maurer 2008). On the other hand, mobile phones are widely used in low-income communities so psychological barriers to mobile financial services are reduced.

### ***Material Access***

In addition to building upon existing trust in Safaricom, M-PESA benefited from the adoption of the mobile phone. As explained above, due to market liberalization, low-cost infrastructure, inexpensive and usable mobile phones, and appropriate business models, mobile phones have become the most popular information and communication technology in the world. Because M-PESA works on basic mobile phones, it is widely accessible. Even more, because an M-PESA account actually resides on a free SIM card, even customers who do not own their own mobile device can utilize M-PESA by

borrowing a phone and momentarily swapping SIM cards (Hughes & Lonie 2007).

M-PESA was also designed to boost material access in other ways. Registration is free and simple, requiring only a national ID, as opposed to the more rigorous applications for a formal bank account. These lower barriers are seen as pro-poor: “The director of a Kibera-based MFI mentioned that M-PESA has been more available than banks to the less educated members due to fewer barriers to use M-PESA (such as forms to fill out)” (Haas et al. 2010). There is no minimum balance (Mas & Radcliffe 2010). Importantly, M-PESA users can send money to non-users’ mobile phone who can then redeem that value at an agent for cash, thereby providing material access (Mas & Ng’weno 2010).

In a large-scale survey of branchless banking, McKay and Pickens (2010) found that it was, on average, 19% less expensive than traditional banks that target the poor. At smaller transaction sizes (those popular with the poor), the disparity was even greater: 38%. More specifically, M-PESA is routinely 1/3-1/2 cheaper than banks (McKay & Pickens 2010).

### ***Skills Access***

M-PESA began mostly as a “needs assessment” co-funded by the UK Department for International Development and Vodafone that aimed to understand how mobile phones could be used to deliver financial services, and a focus of this was ease-of-use (Hughes & Lonie 2007). As M-PESA has

grown from this humble beginning, simplicity has remained. As Ignacio Mas and Olga Morawczynski explain, using M-PESA is eminently easy:

The M-PESA user interface is driven by an application that runs from the user's mobile phone. This has several advantages. The service can be launched right from the phone's menu, hence it is easy for users to find. The menu loads quickly because it resides on the phone and does not need to be downloaded from the network each time it is called. The menu prompts the user to provide all the necessary information, one piece at a time, based on the type of transaction requested. Once all the information is gathered, it is sent for processing through the air interface in a single text message. This reduces messaging costs, as well as the risk of the transaction request being interrupted half-way through (Mas & Morawczynski 2009).

If you can send a text message, it's very likely that you can use M-PESA. But even if you have some difficulty operating a mobile phone (which does happen), because the M-PESA standard is more than software, and includes the agent network, skills access is helped: withdrawals and deposits almost always occur at M-PESA shops, so users can be guided through the process.

### ***Usage Access***

Even with psychological, material, and skills access, if significant amounts of Kenyans had no use for M-PESA, its adoption would have been paltry. However, perhaps the most interesting manner in which M-PESA has spread according to van Dijk's framework is as a standard that presented significant opportunities for usage, most prominently as a method for domestic remittances.

Like many countries, Kenya has experienced significant urbanization in recent decades as previously agrarian lifestyles have been swapped for urban livelihoods. Importantly, this trade is not permanent or clear-cut, and

most migrants maintain strong, lasting relationships to the rural areas of their youth or ancestors. This so-called “dual system” has been extensively documented throughout Africa (Gugler 1971, 1975, 1991, 2002) and serves a variety of needs, including as an informal safety net during exogenous shocks (Ross & Weisner 1977). One of the primary means for maintaining this connection is through the practice of domestic remittances, both cash and in-kind transfers. These transfers tend to be consistent with wealth distribution: from urban areas to rural areas (Oucho 1996).

The practice is also widespread. A national survey of Kenya in 2007 found that 33.4% of respondents had participated in domestic remittances, as opposed to just 3.5% who did so internationally (FinAccess 2007). Although cash is the most popular form of remittance, “it is common for migrants to send urban-type items, such as furniture, wall clocks, and radios back to the rural” areas (Morawczynski 2008).

Traditionally, remittances flow through a variety of channels, with the “most popular amongst low-income Kenyans [being] the informal channels” (Morawczynski 2008). Sending cash via friends or family that were traveling was a particularly popular method, with 58% of respondents choosing the method (FinAccess 2007). This was often the least expensive manner to remit, but also the riskiest due to highway robberies (Hughes & Lonie 2007). Public buses, though unlicensed to transfer money, were another popular way due to their wide reach and relative reliability (Morawczynski 2008). Additionally, the post office and Western Union are used for remittances, but

considered expensive and have limited rural presence (Mas & Radcliffe 2010). Despite these options, prior to the launch of M-PESA, a survey found “service gaps, inefficiencies, and unmet demand” within the domestic remittance market (Kabbucho et al. 2003).

The team behind M-PESA recognized this opportunity. A large-scale launch of M-PESA’s original concept – the repayment of microfinance loans – was deemed too complex, so facilitating domestic remittances was settled upon. M-PESA was simplified to focus on peer-to-peer value transfers, and the widespread marketing campaign became “Send Money Home” (Hughes & Lonie 2007).

Users, primarily for domestic remittances, rapidly adopted M-PESA. According to fieldwork conducted in 2007, only months after the launch of M-PESA, in Kibera, M-PESA was used by a majority of surveyed residents to remit money back to rural homelands and “many did not know that the application could be used for any other purpose.” The practice was common. Many residents remitted at least once a month, but others did so less frequently or only when requested. Respondents said they would remit as long as they were financially able to do so. Although most remittances were for family members, some respondents used M-PESA for commercial transfers or political campaign money (Morawczynski 2008).

The significant usage opportunities were fueled by higher speed, lower cost, and greater reliability inherent in the M-PESA standard. That other remittance standards were prone to theft or unexpected costs, and

thus unreliable, makes M-PESA a relatively better option. Additionally, users were happy to remove the “middle-man” transferring the remittance, and instead send money directly to the intended recipient’s phone (Morawczynski 2008). Convenience and security are among the top perceived benefits of using M-PESA, manifest as easier transactions and increased financial security (Haas et al. 2010).

M-PESA also presented non-remittance usage opportunities due to reasons intrinsic to the standard (relatively better reliability, higher speed and lower cost). Early on, M-PESA was used to store money because thieves would need the secret PIN, unlike with cash. Even if users already had a bank account, the branch may be distant, and mobile financial services were more convenient, so they operated as an informal bank account. Additionally, the ability to use stored M-PESA value to purchase airtime after dark when crime is frequent was cited as a benefit of M-PESA (Morawczynski 2008).

#### **INTRINSIC CAVEATS**

The intrinsic reasons to adopt M-PESA should not be taken without qualification. Inherent qualities are far from deterministic, and M-PESA had its share of difficulties. The fee structure of M-PESA makes very small transactions (such as one-off purchases) expensive. At the other end of the spectrum, as a security mechanism, M-PESA currently limits transfers to KSh 70,000 and this is not always sufficient. For example, because “first [school] term fees are high... many parents use banks – not M-PESA – to send money orders” (Haas et al. 2010). Furthermore, mobile phone ownership is not

universal in Kenya, and 60% of non-users cite their lack of a mobile phone as the reason for not using M-PESA (Jack and Suri 2011). For agents, the start-up fees can be too high, and managing liquidity is difficult (Eijkman et al. 2009). For the usage barrier, 12 percent of respondents in a national survey from 2009 said they had no need for mobile money (“Kenya Case...”).

It is possible that these intrinsic difficulties were minimal enough relative to the intrinsic benefits of the M-PESA standard, but, as the next section will argue, there have been significant reasons to adopt M-PESA that arise not from its inherent qualities, but instead from the scale of the network that it has developed. That is, network power has begun to encourage the adoption of M-PESA.

#### **Extrinsic Reason and Indirect Force**

The above exploration of the intrinsic reasons to adopt M-PESA provides compelling evidence that customers use M-PESA because it better meets their needs than alternative networks, such as Western Union or buses. However, this assumes that customers adopt M-PESA in a situation of free choice, and while this very well may have been the case at the early stages of M-PESA (after all, Safaricom never forced registration), as it has grown, there is reason to believe M-PESA has been adopted due to reasons stemming from the size of the network, not the standard’s inherent design.

Recall that in Grewal’s theory of standard adoption and network growth, intrinsic reason is only one factor in the adoption of a standard such as M-PESA. Extrinsic reasons, direct and indirect force, and chance all

similarly have a role to play. Along the way to a standard gaining network power, there are thresholds at which a standard exhibits new phenomenon. Grewal emphasizes two specifically: the threshold of visibility and the threshold of inevitability.<sup>7</sup> The former refers to the point when a network is sufficiently large to become attractive to non-users. “Below this threshold, a standard has no network power because it is effectively invisible to those outside the network.” The second threshold is “the point past which a network has become so dominant that we can expect virtually all non-users to adopt its standard.” Convergence on the standard becomes inevitable. And if any standards are incompatible with the universally adopted standard, meaning a user cannot use two at the same time, then the elimination of others is inevitable, as well. This is the strongest form of network power, when network effects and the disappearance of alternatives form a positive feedback loop leading to hegemony and monopoly.

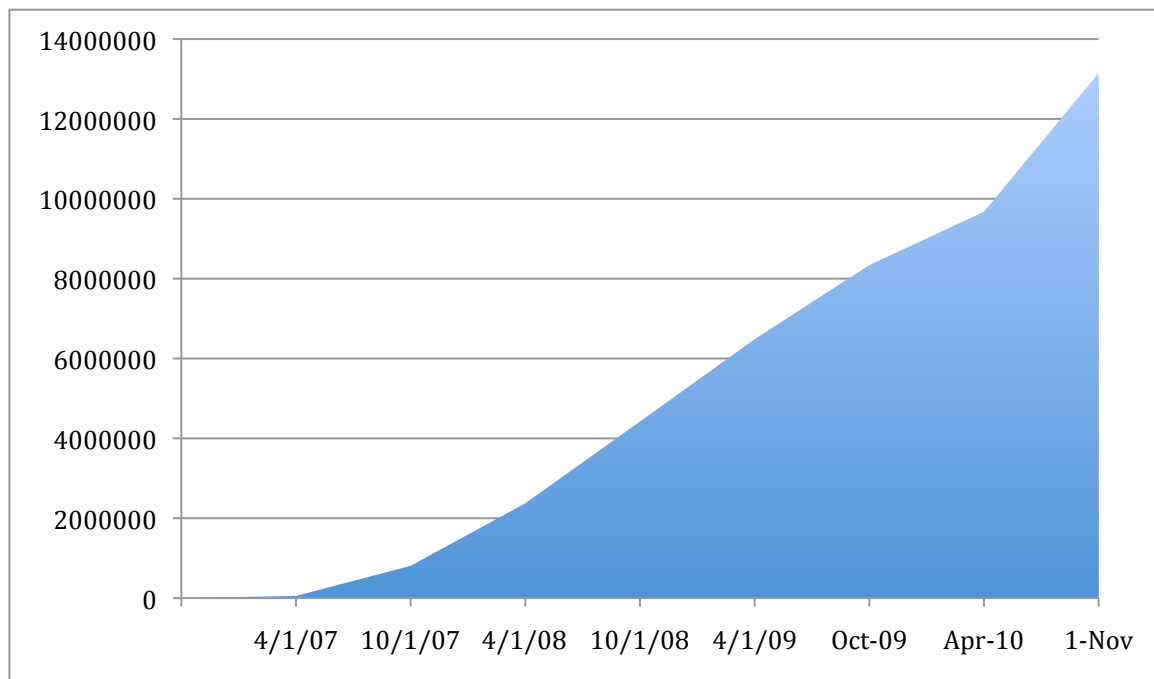
It seems clear that M-PESA has passed the threshold of visibility, after which a standard may exert network power. Safaricom spent considerable money and time on marketing M-PESA, through various mediums and in a consistent and understandable manner. Awareness was quick to spread: already by late 2008, only 18% of non-users in a nationally representative survey reported not knowing about M-PESA. A year later, this figure was down to 3% (Jack & Suri 2011). In neighboring Tanzania, an M-PESA initiative has struggled to gain users, partly because “people are aware of the

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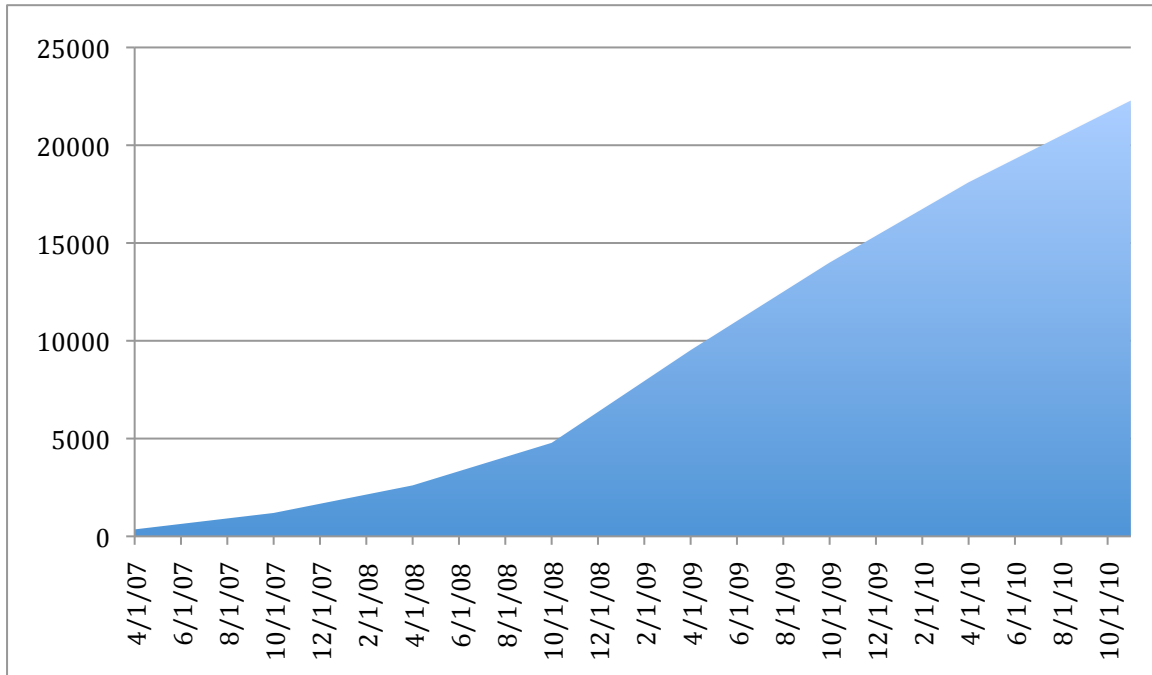
<sup>7</sup> “Importantly, these thresholds are subjective and not necessarily determinate or objective” (Grewal 2008).

brand but many do not know what it is about or how it functions” (Camner & Sjöblom 2009). This underlines that in order to pass a threshold of visibility: a standard needs to be more than simply visible, but comprehended.

Buoyed by this visibility, and driven by the inherent benefits of the standard, M-PESA has sustained rapid growth. Within two years, it was already registering 10,000 new customers per day (“M-PESA: The Innovation”). By November 2010, M-PESA had more than 13 million registered customers (“M-PESA Customer...”), or nearly 60% of Kenya’s population above 15 years old (“Kenya Statistics”). This customer growth has been matched by a proliferation of M-PESA agents, which numbered more than 22,000 in November 2010.



**Figure 6. Growth of M-PESA Customers**



**Figure 7. Growth of M-PESA Agents**

National household surveys similarly emphasize the scale at which M-PESA operates. In late 2008, 43% of households had an M-PESA user; a year later, that number was 70%, and given the continued growth reported by Safaricom in the data above, it is likely even higher now. A similar growth was noted in the number of monthly transactions, which increased from 354,000 in July 2007 to 16.7 million in July 2009 (a 4600 percent increase). In that same month, July 2009, the value of M-PESA transactions was 4.36 percent of commercial bank deposits in the country, or US\$535 million, in a country where the national GDP the year before was only US\$30.24 billion (Kimenyi and Ndung'u 2009).

Although M-PESA, like other technologies, was originally adopted on average by the more wealthy and educated Kenyans, with time, it is being adopted by a much broader share of the population (Jack & Suri 2011). For example, in the period between late 2008 and 2009, the proportion of users who were female grew to 44 percent, up from 38. Although there are those who remain non-users – and those are the least well off in society – the M-PESA standard has been adopted to a remarkable degree by a wide portion of Kenyan society. This wide adoption has numerous benefits; after all, larger networks are more useful to participants.

While this growth was initially driven primarily by inherent qualities of the standard, M-PESA was purposefully designed to better exert network power by reaching large scale. Safaricom faced adverse network effects in at least two ways with the launch of M-PESA: it needed to attract both customers and agents at the same time. A customer is unlikely to register for M-PESA if others are not using it, and both agents and customers are unlikely to join without the membership of each other in the network.

One of the most obvious ways in which this was overcome was through the fee structure of M-PESA. M-PESA customers are able to send value to non-users, but this incurs a higher cost on the customer than if the recipient had been registered for M-PESA. Like other instances of differential pricing (Shapiro and Varian 1998), this extends de facto access to a portion of the M-PESA standard (agent-based withdrawals) to a much larger network than only M-PESA users (in effect, everyone with a mobile phone). Moreover,

by imposing a higher fee on the sender, M-PESA provides an incentive for users to encourage their recipients to sign up for M-PESA. Indeed, “many rural cash recipients reported that their urban relatives, the senders, persuaded them to sign up with M-PESA” (Mas and Morawczynski 2009).

So not only did the dominance of the mobile phone market by Safaricom provide a form of network power from the launch of M-PESA (e.g., a large population of existing customers who already used the underlying Safaricom network), but the fee structure encouraged adoption of the M-PESA standard, too. Even more, researchers have confirmed that individuals perceive M-PESA as a means to transact with a wider network of individuals than would otherwise be possible (Haas et al. 2010). Thus, existing stores that became M-PESA retailers had expanded businesses (Plyler et al. 2010). In short, adoption has been driven by the size of the M-PESA network relative to alternatives.

The M-PESA agent network has also been driven by network power. At launchtime, the large existing network of Safaricom airtime retail agents provided existing scale to the new standard. Not all standards build on existing ones as obviously as M-PESA did, but because it iterated from the beginning on the existing network power of the Safaricom subscribers and retail agents, network power was far more likely and influential in the growth of M-PESA than other standards that begin more *de novo* (Maurer 2008). Although many existing Safaricom airtime retailers were willing to become M-PESA agents because they trusted the inherent benefits it would

bring, in time, the sheer quantity of M-PESA users that need to perform deposits and withdrawals has come to act as a positive feedback loop that drives the agent network to grow with it. In fact, the popularity of M-PESA has made retail agents “a viable stand-alone business” (Mas & Ng’weno 2010). Safaricom has carefully managed the number of licensed agents to meet demand while ensuring profitability (Mas & Radcliffe 2010). Not becoming an M-PESA agent entails a lost opportunity for new profitability due to the huge amount of M-PESA transactions occurring daily. As such, in addition to existing airtime retailers, banks, SACCOs, stores, gas stations, and courier services have all become agents (“M-PESA: The Innovation”). The institutions that are increasingly using M-PESA to transact with individuals (e.g. through bill payment or salary dispersal) are, too, encouraged by its widespread popularity. As the International Financial Corporation put it, implicitly acknowledging the network power of M-PESA, “Partnerships with industry participants will form naturally once the Mobile Money provider has achieved critical mass” (IFC Three...). Importantly, that critical mass is unlikely to be reached by many other financial providers.

At some point in the past few years, M-PESA’s growth became more than simply intrinsic reason and chance. The world’s premier mobile financial service passed the threshold of visibility where sufficient scale allowed network power to arise and begin pulling non-users into the network. It is not clear that M-PESA has passed the second threshold where adoption becomes inevitable – especially since this is a subjective

phenomenon – but it may have occurred within certain populations, such as remitters.

In fact, there is significant evidence that other forms of remittances are being displaced. Camner, Sjoblom and Pulver (2009) found a “massive” reduction in using hand, Post Office, bus or courier companies for remittances after the launch of M-PESA. Similarly, the World Bank reports that “by 2009, mobile money transfer had almost entirely displaced transfers via the post office and via bus/matatu (minibus), which were previously popular methods. A substantial minority, however, still send transfers via friends and family.” In 2006, prior to the launch of M-PESA, money was sent by friend or family (50%), bus (29%), money transfer services such as Western Union (29%), check (9%), direct deposit (6%), post office money order (4%), and other (2%) (FinAccess 2007). In only a year and a half after the launch of M-PESA, it accounted for 47% of money transmissions, followed by hand (32%), bus (9%), direct deposit (7%) and other (6%) (Pulver 2009).

Replacing alternative financial services is a stated goal of Safaricom, whose former CEO has said the “company was leading the way towards a cashless society where most payments will be made via the telephone or online, hence reducing risks involved in carrying cash” (“Safaricom in Another...”). Similarly, the global association of mobile operators, the GSMA, “uses the term mobile money, recognizing that the primary purpose of mobile-enabled schemes is for cash substitution purposes” (Dermish et al. 2011). Although data are hard to come by, increasingly this is becoming a

possibility. While M-PESA has almost completely replaced alternative remittance channels (Jack and Suri 2011), the standard has expanded into interest-yielding bank accounts, business-to-customer payments (such as electricity bills or tickets), and even insurance and credit services. One of the closest observers of M-PESA has remarked that, “Where most financial inclusion models have employed ‘credit-led’ or ‘savings-led’ approaches, the M-PESA experience suggests that there may be a third approach – focus on first building the payment ‘rails’ on which a broader set of financial services can ride” (Mas & Radcliffe 2010). In this way, M-PESA is an ‘enabling technology’ with an extensive range of uses (Lipsey & Bekar 1995).

As this research was being finalized, The Bill & Melinda Gates Foundation, which supports the mobile money industry, noted that the service was becoming a significant means of payments (as opposed to just peer-to-peer transfers). From East Africa to Pakistan, “market traders, fish sellers, store owners, market middle men, etc.... use mobile money as a key part of their business” (Kendall 2011). In fact, research into mobile money users in Uganda found that nearly 33 percent of transactions were to purchase or sell goods and services (aside from airtime) (Ndiwalana 2010). Elsewhere, in Tanzania, a study of small businesses argued that they “may help “diffuse” mobile money by prompting customers and suppliers to sign up” (Bångens & Söderberg 2011). The same study reported that business users of mobile money are “not always happy with quality of service and cash availability at M-PESA agents who are more used to smaller value

transactions” (Kendall 2011). To put it differently, mobile money is expanding from predominantly remittance transfers to a wider diversity of financial interactions. While often spreading due to relative advantages inherent in the standard, it is increasingly the case that the proliferation of mobile money is due to network effects and displacement of alternatives; mobile money’s future is driven by network power.

To be clear, the totalizing effects of M-PESA should not be overstated. For one, although cheaper than many alternatives, M-PESA may still too expensive to use in very small transactions (Comminos et al. 2008). A purchase of about US\$1.20 would result in a thirty percent fee from M-PESA, meaning that “only a fool would pay for his yams in the market that way” and that “for now at least, Kenya is not leapfrogging to an all-electronic, cashless economy” (Roodman 2010). Additionally, some researchers have cautioned that “the volume of financial transactions mediated through M-PESA should not be exaggerated” because bank-to-bank transfers still dwarf person-to-person transfers. While this is true, M-PESA is not, as some have argued, a “niche” product (Jack & Suri 2011). The government of Kenya is actively pressuring Safaricom and other mobile money operators to lower fees to make small purchases more affordable. And while some transactions (i.e. bank-to-bank transfers) will likely remain the purvey of alternative systems, it is clear that mobile money such as M-PESA is, and will continue to be, adopted widely.

Given that network power is at work for the M-PESA standard, the next section considers what this form of power, often acting on Kenya's poorest, means in terms of development. Specifically, it interrogates the significant literature on M-PESA to highlight the type of force the standard is exerting and consider the implications for development as freedom.

## **VI. Assessing M-PESA's Network Power**

There is nothing *prima facie* bad about adopting M-PESA because of the size of the network, but the insight of the theory of network power is that larger networks may displace alternative standards and thus limit freedom of choice. To the extent that this has been discussed, ever so briefly, in the context of M-PESA, it has largely been seen as a benefit. The rhetoric surrounding M-PESA is of an innovation displacing unreliable remittance methods, therefore improving Kenyan economic efficiency. Instead of unqualified support for "innovation" or "efficiency," donors, practitioners and academics should discuss the rise of standards with an eye towards the larger implications of power and freedom (Knight 1997). In situations of network power, the interplay can be subtle, complex and difficult to ascertain conclusively or quickly, but in the case of M-PESA, some exploration of the phenomenon is possible.

The reduction in alternative standards is worrisome because although people are not coerced into adopting M-PESA, the mere act of choice does not entail freedom. Instead, "free choice must be defined not merely by the fact of

someone's having chosen something, but by the existence of viable alternatives available to her at the time when she made her choice" (Grewal 2008). The existence of viable alternatives at the time of choice is what the philosopher Serena Olsaretti calls "voluntariness," as opposed to mere freedom of choice. The more viable alternatives exist, the less force is pushing an individual towards a given option. To pick a crude example, consider being told to do something at the point of a gun; inaction remains a choice, but hardly an acceptable one. Put differently, freedom to choose is insufficient compared to freedom to choose freely amongst acceptable alternatives. This distinction is relevant in situations of great network power where a standard may be adopted non-voluntarily because of a lack of viable alternatives. Although one still has the choice to avoid a dominant network, non-membership comes with significant costs, such as the difficulty of coordinating with those in the dominant network. Just as membership in large networks has increasing benefits, membership in small networks has increasing costs (Tongia & Wilson 2011). The impetus to adopt a growing standard is network power and is a substantive check on the voluntariness of one's choice. Because the poor are usually late adopters of technology (Rogers 2003) and have adopted M-PESA more slowly (Jack & Suri 2011), the exhaustion of alternatives through the rise of a dominant standard may even be more detrimental to them.

## **Development as Freedom**

Consider a hypothetical migrant in Nairobi who wishes to send a remittance to his family in a distant village. Prior to the rise of M-PESA, this was done through a variety of means, but as M-PESA has grown and replaced alternative means of remittance, the choice increasingly becomes a) send money through M-PESA or b) don't send money. Clearly, the former is a choice many Kenyans make – indeed, it is an option that much of the development community works to make possible – but assessing the impact of this transformation requires doing so within a theory of development.

However, the concept of development is highly contested. Historically, development was analogous with economic growth (Hirschman 1958; Rostow 1960) but sustained criticism has stressed that inequality and dependency are basic components of capitalist development that must be addressed (Prebisch 1950). Other theorists have focused on the institutional arrangements of nations (North 1990) or on sustainable and participatory approaches (Chambers 1983). For some, development has even largely been dismissed (Ferguson 1994).

But as Kleine (2010) writes, “arguably the most influential challenge to the mainstream growth-focused view of development has come from Amartya Sen’s capability (or capabilities) approach in which development is defined as ‘a process of expanding the real freedom that people enjoy’ (Sen, 1999: 3) to ‘lead the lives they have reason to value’ (Sen, 1999: 293).” Like many others, Sen demurs from traditional economics, which equates

development with increased wealth, quoting Aristotle (2009) that “wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else.”

Instead, Sen concludes that development should increase well-being in terms of “how a person can ‘function’” (Sen 1985). The sundry objectives and goals a person has are, in Sen’s terminology, his or her “functionings” and the goal of development is to increase the capability of reaching those objectives. Correctly conceived, development is a process of continually enhancing human freedom. Thus, freedom is a substantive good in itself.

Additionally, however, enhanced freedom is an instrument that is essential to the development process. Specifically, Sen identifies five instrumental freedoms that are useful as developmental tools. The first is *political freedom*, which refers “to the opportunities that people have to determine who should govern and on what principles” in addition to the ability to scrutinize and criticize authority, make political expressions, organize peacefully and so on. Secondly, Sen promotes *economic facilities*, or “the opportunities that individuals respectively enjoy to utilize economic resources for the purpose of consumption, or production, or exchange. Sen’s concept of *social opportunities* refer to “the arrangements that society makes for education, health care and so on, which influence the individual’s substantive freedom to live better.” As an example of how these instrumental freedoms mutually reinforce, Sen notes that illiteracy forms a significant barrier to economic activity (i.e. employment) and political participation (i.e.

reading newspapers); as such, enhanced educational opportunities are instrumental in the promotion of economic and political freedoms. The fourth category is the *transparency guarantees* that allow society to interact with appropriate disclosure and mutual trust. Finally, *protective security* “is needed to provide a social safety net for preventing the affected population from being reduced to abject misery, and in some cases even starvation and death.” There is considerable empirical evidence that supports Sen’s belief that these freedoms are instrumental in the capacity of humans to attain their self-set goals of well-being (Sen 1999).

However, there exists a broader and distinct conception of freedom than this ‘well-being freedom.’ Sen writes that this alternative, ‘agency freedom,’ “is more general, since it is not tied to any one type of aim” (Sen 1985). In this notion of liberty, freedom to choose, even to one’s own detriment, is more valuable than the bounded freedom to improve well-being. Although the link between these is close, “the judgments of agency freedom and well-being freedom can move in contrary directions” as in situations when an individual chooses to sacrifice some or all of his well-being for the benefit of another (Sen 1985). In such a case, one has the expanded agency to make the altruistic choice, but one’s well-being is decreased.

The reason for the existence of these two (related) notions of freedom is the internal plurality of personal freedom. Within the idea of individual freedom, there are two distinct elements: *effective power* and *procedural*

*control*. The achievement of a goal generally requires *control* over the process (i.e. the manner in which one will go about striving) and the *power* to reach that goal (i.e. the necessary capabilities and endowment to succeed). In an ideal world, free individuals would have power and control, but the reality is often different, meaning that control may not lead to power or that power may not need control.

As an example of the distinction, consider a comatose patient whose guardian is given two equally effective medical options, A and B. Option A will result in fewer painful side effects, but it is associated with experiments on live animals of which the patient strongly disapproves. The patient “would, in fact, agree that treatment A would have been better for his well-being, but as a free agent he would have nevertheless chosen treatment B, if he were given the choice” (Sen 1985). A guardian who chooses option B is providing effective power to the patient, even though the coma removes procedural control.

Sen believes that the complexities of modern life make individualized procedural control impossible in many cases – there are simply too many interdependencies to make it feasible. Instead, the effective power of individuals should be achieved through “what all, or nearly all, members of the group would have chosen” could they each have procedural control. Under this reasoning, forms of authority or power are legitimate if they empower individuals in a way they would choose were it feasible. Libertarian thinkers, such as Robert Nozick (1977), differ, privileging procedural control

as the key to liberty, but Sen cautions against ignoring effective power. “It is not my intention to deny that the control element of freedom is indeed important in many contexts. But it is not the only important element in freedom. The power element cannot be neglected in any adequate formulation of freedom or liberty” (Sen 1985).

<b>Development as Freedom</b>	
<u>Instrumental Freedom</u> 1. Political freedom 2. Economic facilities 3. Social opportunities 4. Transparency guarantees 5. Protective securities	<u>Substantive Freedom</u> 1. Procedural control 2. Effective power

**Figure 8.** The types of *instrumental freedoms* and elements of *substantive freedom*.

If one addresses the impact on instrumental freedom, the results have been impressive. Appendix B builds on the collection of impact studies in Appendix A by aggregating and organizing the literature reviewed in Section IV through Sen’s instrumental freedom framework. The financial transaction that has most significantly been impacted thus far, remittances, is now safer, faster, and less-expensive than by means of another financial instrument. This means users have expanded economic facilities, additional social opportunities and protective securities, and perhaps even increased transparency guarantees or political freedoms if Safaricom is a more accountable financial intermediary. And as an enabling technology, other sectors will be able to benefit from M-PESA, too.

Indeed, Amartya Sen (2010) has addressed the ability of ICTs to enhance instrumental freedom. Although hardly a focus of his work, Sen has argued “telephone networks... have been, in general, a boon, rather than a curse, for societies.” He believes that “a phone is generally freedom-enhancing”. Though he readily acknowledges the downsides to this freedom, in his thinking, they come from negative *uses* – such as terrorists organizing via phones – as opposed to the possibility of emergent forms of power that limit human freedom to choose freely. In a certain, fundamental way, Sen is correct that ICT is freedom enhancing – it gives human, both well- and ill-intentioned – the ability to overcome limitations of space and time. However, the phenomenon of network power suggests that through the diffusion of ICT, limitations on human freedom may emerge.

To understand why, it is necessary to turn to the substantive concept of freedom, where liberty is a good unto itself. Here, the impact of M-PESA is more mixed. The network power of M-PESA means that in a wide variety of financial interactions, the procedural control of Kenyans has been diminished. Our hypothetical remitter has seen his array of options shrink such that “mobile money or bust” is not too much of an exaggeration. The choice between a) remitting via M-PESA or b) not remitting is insufficient for any rich theory of human freedom. To be clear, this is something of an immoderate hypothetical; alternatives are available, but in greatly diminished variety – to an increasing extent, the choice available is M-PESA or one of the smaller competing mobile money services; that is, mobile

money generally, not just M-PESA specifically, will begin to exert network power on a scale no single provider could realize. The lack of procedural control of the hypothetical remitter is but a harbinger of the impact of mobile money's network power on individuals and organizations pursuing other financial dealings. As more and more individuals and organizations adopt M-PESA, driven by the combination of network effects and reduced alternatives, this limitation on the procedural control element of freedom will be replicated in fields as diverse as retail payments, salary disbursements, and business-to-business billing.

Convergence upon on standard (e.g. M-PESA) and not another (e.g. informal bus remittances) brings a concomitant privileging of certain norms and values that are embedded in the standards. Standards are not neutral. This is true for technological standards in general (Lessig 2000; van Schewick 2010) and financial ones in particular (Maurer). Regardless of the conditions under which the choice to adopt a standard was executed, "some decisions are already made long before" a standard ever gets used (Kleine 2011). In the case of M-PESA, the qualities that make it appealing (speed, cost, and convenience) are not without downsides. The social context of money is highly complex and nuanced, so technological innovation will have subtle and unpredictable implications (Rogers 2003). To understand why the means of remittance is important, and not just the transfer of value, consider the following conversation (Morawczynski 2009):

*Shoemaker: Before M-PESA, I would give money to my friend. He would*

*go home every two months...I usually gave him 2000 [KES] for my wife and parents. I also contributed 300 [KES] for his transport, and another 200 [KES] to say thank you. Interviewer: So, you sent about 1000 per month.*

*S: [Nods].*

*I: And now?*

*S: Now I am sending every two weeks. But I send a smaller amount. Usually 700- 800 [KES]. I can send her more because I save on the transport cost. I also don't pay my friend.*

*I: Now you are sending about 1400-1500 per month? Your wife must be happy.*

*S: Yes. [laughs]. But my friend is not.*

The change in remittance behavior suggests that they are price elastic and increase with lower transaction costs. The low cost and high efficiency of mobile money, in addition to the wide reach of the M-PESA network, encourages people to send remittances through it. But, as the final line indicates, changes to financial practices have implications for social relationships. Disintermediation, typically considered economically efficient, could very well have negative implications for social capital, an important part of development (Fukuyama 1995).

Morawczynski (2008) identified a similar strain on social capital as increased remittance solicitation and decreased rural visits proved onerous, and Hughes and Lonie (2007) note that an early microfinance institution that adopted the technology was disturbed to find that attendance at group meetings decreased. Future research should seek to understand the

embedded values potentially being lost with displaced financial standards, who is affected, and to what extent they have free choice in the matter.

This caution should not diminish the rightful recognition of the positive expansion of human freedom that M-PESA has enabled. If the other internal element of substantive freedom is considered, the impact of M-PESA has been different.<sup>8</sup> The M-PESA standard began to achieve network power precisely because it more effectively empowered users to conduct financial interactions. The networks being displaced by M-PESA are often onerous and risky, limiting the capability of Kenyans to achieve their functionings through high costs and unreliability. The convergence upon a standard with multiple inherent advantages improves this element of freedom.

This internal conflict within the concept of freedom is not unique to M-PESA. As Sen argues, the multiplicity of actors in modern society often makes procedural control unfeasible. There are simply too many moving pieces to provide individualized control, but policy or practice that allows individuals to achieve the functioning they would have chosen, could they, appropriately enhances their freedom. Similarly, Grewal has noted that standardization is “Janus-faced, generating new forms of freedom and new problems of entanglement.” This is the experience with M-PESA: the process

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<sup>8</sup> In delineating between control and power, one must be careful to avoid creating too much of a binary distinction. As Sen writes, “The well-being aspect and the agency aspect both demand attention, but they do so in different ways, and with varying relevance to different problems” (Sen 1984).

of development using M-PESA has generated new forms of freedom and new problems of entanglement.

A long history of political theory has privileged procedural control, believing unencumbered choice to be a preeminent moral good, but when compared with the situation prior to M-PESA – that of unreliable, expensive and slow financial mechanisms that largely did not meet the needs of Kenyans – it is hard to romanticize unencumbered choice. However, as discussed below, the immense network power of M-PESA has other implications for freedom.

### **Freedom as Non-Domination**

To understand the implications of M-PESA's network power, even beyond the enhancement of effective power and reduction of procedural control, a related, but distinct, notion of freedom is useful. In his *Economy and Society*, the German sociologist Max Weber identified "domination" as "the probability that a command will be obeyed." In contrast to domination by "virtue of authority" which is found in "patriarchal, magisterial, or princely power," Weber noted that domination could arise by "virtue of a constellation of interests" (Weber 1978). In this case, "power need not always resemble authoritarian command" and may, instead, be more dispersed and subtle (Grewal 2008). This manifestation of domination is "based upon influence derived exclusively from the possession of goods or marketable skills guaranteed in some way and acting upon the conduct of those dominated, who remain, however, formally free and are motivated

simply by the pursuit of their own interests.” Weber pointed explicitly to the existence of a “large central bank or credit institution” that can demand acquiescence on the part of debtors, even though the compliance is rationally pursued in self-interest.

Similarly, classical republicanism, as currently espoused most prominently by Philip Pettit, defines freedom as ‘non-domination.’ In contrast to Isaiah Berlin’s famous distinction between positive and negative liberty – where negative liberty is the absence of constraints and positive liberty is the ability to fulfill one’s own potential – Pettit’s theory of non-domination posits that individuals are free insofar as others lack the capacity to arbitrarily interfere in their affairs (Pettit 1997). Arbitrary interference exists when individuals are subject to coercion or manipulation at the hands of others that results in making the subject worse off through fewer options or higher costs. Interference can be legitimate – as in the case of laws decided in a just manner that track the interests of citizens (e.g. taxes for national defense) – but the key is that interference is not arbitrarily decided and exerted upon the subject. Such a scenario would qualify as domination.

Additionally, Pettit’s non-domination theory requires a lack of capacity for interference, not just actual interference. “With freedom as non-domination, a person loses freedom to the extent that they live under the thumb of another, even if the thumb is never used against them.” In this line of thinking, a subservient position puts one under constant threat of exploitation. Of course, domination is not an either-or condition, so the

degree of freedom or unfreedom is to be judged with regard to the intensity and extent of the domination.

On the one hand, Pettit's approach differs from Weber in that republicanism is opposed to interference that makes the subject worse off, while Weber saw domination arising even in cases of mutual interest. On the other hand, Pettit's theory considers subjects as dominated, and thus unfree, even if the harmful interference is an unrealized possibility. In this manner, Pettit sets a higher bar. One may link these approaches by considering situations in which Weber's (1978) "constellation of interests" creates a dominant entity that may or may not later arbitrarily interfere with the less powerful subjects. That is, even in Weberian domination of mutual interest, classical republicanism sees a lack of freedom.

Pettit explicitly links this republicanism to Sen's capabilities approach saying that a lack of capabilities means people are "subject to a certain sort of exploitation and manipulation. Other things being equal, then, any improvement in their lots is bound to reduce the capacity of others to interfere more or less arbitrarily in their lives."

As Pettit makes clear, a lack of capabilities leads to various forms of domination. Perhaps the most famous form related to finance and development is the exploitative nature of moneylenders in low-income areas (Yunus & Jolis 1999). Microfinance has attempted to increase human freedom through the provision of small loans to poor people (Roodman 2011). Analogously, M-PESA allows Kenyans to "route around" dangerous

and expensive informal financial instruments that placed their livelihoods at the mercy of others. Simply by reducing the possibility of robbery, M-PESA has removed the dominating effect of petty thieves (“CGAP Branchless...”).

And yet, it is no coincidence that when we speak of Safaricom and M-PESA, we speak of dominance. Network power has propelled it to dominance, leading to significant market power within one of the least competitive telecommunications markets in the world (Gillet 2011). Just as few would seek to return to a time where the only source of lending to the poor was unregulated moneylenders, supporting many of the financial instruments that M-PESA has crowded out would be foolhardy and counterproductive. However, the insight of the republican approach to freedom is that judging M-PESA’s impact simply on the relative changes is too simplistic, and relying on the goodwill of Safaricom is insufficient (Pettit 2001). The power latent in M-PESA’s dominance means users are unfree under this notion of liberty. This potential should be countered if mobile money is to enhance development understood as freedom.

The assertion that M-PESA has negative influences on the process of development is a heterodox one. Indeed, “most approaches to ICT assume an expansion of human freedom” (Mansell 2002). One of the most sophisticated elaborations of the belief that ICTs are enabling a blossoming of individual liberty is to be found in Harvard Law Professor Yochai Benkler’s (2006) book, *The Wealth of Networks*. Surveying “the emergence of the networked information economy” where the “majority of materials, tools, and platforms

necessary for effective action... are in the hands of most individuals”, Benkler concludes that it marks “the emergence of new practices of self-directed agency” and that “from the perspective of liberal theories of justice... the emergence of the networked information economy is an unqualified improvement.”

Grewal (2008) has critiqued Benkler’s (2006) approach for being too focused on the role of low-cost technology, as opposed to the complexity of social and political institutional arrangements. While the thesis of *The Wealth of Networks* is predicated on a decrease in the cost of capital necessary for production, both within that book and elsewhere, Benkler acknowledges the larger institutions that serve to variously facilitate or curtail the expansion of freedom. For example, “What matters is the extent to which a particular configuration of material, social, and institutional conditions allows an individual to be the author of his or her life, and to what extent these conditions allow others to act upon the individual as an object of manipulation” (Benkler 2006). Elsewhere, explicitly addressing mobile phones in developing countries, Benkler (2010) notes that mobile phones “rely on networks that run all the intelligence in the network, allowing for very cheap edge devices.” Despite the decrease in the cost of capital, Benkler contends that “[we] cannot be neutral” when the low cost of mobile phones “comes at the expense of a truly open, neutral network” (Benkler 2010). Human freedom, in this reasoning, is limited by mobile networks’ legacy of

“engineering, regulatory, and business models” that “embrace controlled infrastructure, proprietary devices, and software controlled by the operator.”

Similarly, Zuckerman (2010) fears that characteristics of mobile networks – centralization, proprietary software, and a lack of privacy – are limiting the development impact. Following Song (2009), Zuckerman points to the high EBITDA (earnings before interest, taxes, depreciation, and amortization) that Safaricom attains as evidence of the vast power accruing to Kenya’s dominant mobile network operator. In 2010, Safaricom reported revenue of more than a billion U.S. dollars and EBITDA of USD \$430 million. M-PESA contributed 9 percent of this revenue (*Safaricom Annual Report*). In one study, the average revenue for mobile money users was 40 percent higher than for non-users (Pickens 2009) and there is evidence that mobile money users are less likely to switch to a different provider (Leishman 2010). Profitable provision of ICT is not objectionable by itself – in fact, the profit motive has driven much of the industry’s advance over the past twenty years – but distribution of costs and benefits should be considered. Gillwald and Stork (2008) found that spending on mobile telephony exceeds 50 percent of disposable income in Kenya.

The network power of M-PESA is an emergent social phenomenon that has done much to drive this situation, but active revision of the technological and institutional arrangements in Kenya should be examined and made to reach appropriate outcomes.

For example, the Kenyan government has mandated ‘mobile number portability’, meaning that a customer switching providers is allowed to transfer their phone number to their new provider. The inability to maintain one’s phone number between networks “has been a major impediment for Safaricom users to join rivals’ networks despite the [other] operators offering lower rates” (Ngigi 2011). At the expense of Safaricom, number portability will increase the effective freedom Kenyans have over their communications, but Safaricom is betting that its exclusive provision of M-PESA will retain customers. The need to continue to financially interact through the wide network united by the M-PESA standard means that users have limited ability to switch providers, even with number portability. The network effects of M-PESA have led to path-dependence, meaning that users are ‘locked in’ and have limited ability to switch to a new standard (Arthur 1994).

But does this dominance come from mutually aligned interests? With Safaricom receiving a handsome return on its daring investment and customers benefiting from the various improvements represented by M-PESA, some have labeled the outcome a “win-win” (Clifton & Ahmad 2009). A more abstract way to put this is that network power “does not mean that an extrinsic reason displaces any intrinsic reason for choosing a standard, but simply that the matter becomes overdetermined. The intrinsic merits of a standard will usually remain relevant even with the increased effects of

network power, but they will be supplemented – and perhaps, eventually wholly outweighed – by extrinsic reasons” (Grewal 2008).

Even phenomena that result in absolute gains for all – the proverbial tide raising all boats – are not necessarily appropriate forms of development. As Sen (2002) writes with regard to globalization,

[T]he central issue in general is not whether a particular arrangement is better for everyone than no cooperation at all would be, but whether that is a fair division of the benefits. One cannot rebut the criticism that a distributional arrangement is unfair simply by noting that all the parties are better off than they would be in the absence of cooperation; the real exercise is the choice between these alternatives.

The same principle – that the relative distribution of the benefits is the real issue at hand – holds for the dominance of mobile money. Even more, although M-PESA has grown due to a “constellation of interests” this mutual benefit could prove to be short-lived. Given its overwhelming market position, traditional fears about monopoly must be considered. These range from stifling new innovations to setting prices artificially high (Shapiro and Varian 1998). As Pettit’s approach emphasizes, the ability to make one less well-off through less choice or higher costs is a form of unfreedom.

The arrangement of the institutions that provide the context for mobile money, from regulation to technology, can, and should, be structured to minimize the distributional concerns while maximizing the benefits of mobile money. Both development and domination exist along a range of possibilities, and increasing human capabilities and reducing domination along the spectra are positively reinforcing processes (Pettit 2006). The next

section takes some preliminary steps towards this goal of increasing human capabilities and reducing domination through mobile money.

## **VII. Maximizing the Development Potential of Mobile Money**

In the case of mobile money, enhancing freedom both through increasing capabilities and reducing domination is possible. Given the fast moving nature of the industry, the specific institutional and technical arrangements are difficult to ascertain, but some generalizable principles and characteristics are possible to outline.

Structuring mobile money to be freer is a form of counter-power. The challenge is to maintain the benefits of mobile money, which often only arise at scale, while minimizing the characteristics that lead to a lack of freedom, and thus development. Generally, the goal can be considered to “provide alternative and multiple channels for access, thereby refusing to privilege just one standard.” Grewal identifies three properties of standards through which counter-power can be exercised: 1) availability, 2) malleability, and 3) compatibility.

*Availability* is the “ease with which a network accepts new entrants desiring to adopt its standards.” Usually, greater accessibility will lead to greater network power: the easier it is for people to join, the more likely the standard will be attractive for the size of the network it unites.

The second network property is *malleability*, or the extent to which a standard is “open to (piecemeal) revision.” Standards will differ in the degree

to which they accept deliberate changes, though alterations will typically be gradual because a radical change would prove disruptive to the network.

Finally, *compatibility* refers to the “acceptance of parallel or simultaneous standards to gain access to a given network.” Like the other properties, compatibility exists along a continuum from strict incompatibility to total compatibility. Compatibility, or as we will call it (following existing discourse), *interoperability*, is the most important variable to the ability of mobile money to enhance human freedom.

These properties are related in complex, often oppositional, ways that change throughout the life of a standard. For example, in order to lower the switching cost, a new standard is likely to be highly interoperable with alternative standards; if it obtains dominance, though, the incentive may be towards less interoperability, in order to maintain users. Additionally, malleability and availability exist in tension because a standard that is highly revisable and open to many will begin to lose coherence. Despite these conceptual difficulties, it is possible to analyze M-PESA through these properties.

#### **AVAILABILITY**

As detailed in Section V, mobile money providers like Safaricom know that widespread availability is a necessary component of success. Commercial viability only comes at large scale (“CGAP Branchless Banking Database”), so to the greatest degree possible, mobile money must be easy to adopt and use (Mas & Kumar 2008). Due to the commercial interest in making M-PESA

highly accepting of new end-users, the ‘invisible hand’ will do much to expand availability; however, as with ICT more generally, the most marginalized members of society may very well be excluded (Castells). Although mobile phones have done much to bridge the digital divide, access in countries like Kenya is far from universal. Although mobile phone ownership is not required to use M-PESA – a user could register, receive a free SIM card, and then borrow a phone – lack of mobile ownership is cited as the largest barrier to use.<sup>9</sup> As with telecommunications more generally, where government universal access and service funds support the deployment of infrastructure in unprofitable areas, there may be a role for public support of mobile money. One way that this has been suggested is for governments to use mobile money to distribute social transfers, wages, or pensions. Globally, at least 170 million low-income citizens receive such dispersals. If governments used mobile money, it could provide a strong market pull (Andes 2010). As the IFC suggested, “Mobile money will only have the desired impact if it is available to everyone and affordable by even the poorest of the poor. Should this not be the case, mobile money could potentially negatively impact those that do not have access to this service in the short to medium term” (“IFC Three...”).

Aside from the end-users who are individual customers, mobile money must also easily accept new institutional entrants. Bulk users, such as

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<sup>9</sup> That being said, even the most comprehensive survey (Jack and Suri 2011) does not cover the most rural areas of Kenya; that is, no data exists on the areas least likely to have access to M-PESA and most likely to form the “black holes of informational capitalism” (Castells 1998).

businesses disbursing salaries via mobile money, and merchants, such as grocery stores accepting payments from mobiles, currently face much more difficulty adopting M-PESA than individual users. Much of this is historical – M-PESA began as a peer-to-peer money transfer service – and the technology is designed as such, but given the enormous network of users, businesses are clamoring to adopt the standard, too.

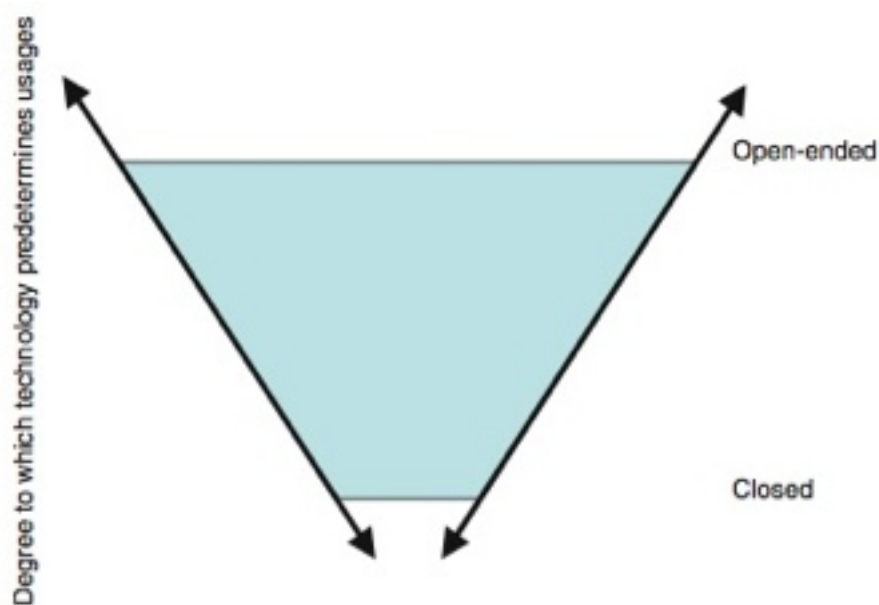
### **MALLEABILITY**

Increasing the availability for institutional entrants, though, will likely require an increase in the malleability of M-PESA. As Zittrain (2008) has argued, technologies that are “generative”, meaning those that accept contributions from a wide variety of users relatively easily, provide for far more innovation than those that are relatively locked-down. As proprietary software of Vodafone, M-PESA does not accept the dynamics of tinkering and experimentation that characterizes open standards such as the Internet (van Schewick 2010).

The malleability of a standard is more than a binary condition of open/closed or generative/sterile. Like other infrastructure, M-PESA is embedded in other systems and built upon an installed base (Starr 1999). The M-PESA software resides on the customer’s SIM card, which is the most local layer of the larger infrastructure in which M-PESA is embedded and built upon, the GSM standard through which most mobile phones function (Lin & Chlamtac 2001). While the Internet is malleable at a fundamental level, the GSM standard typically only allows for revision or alteration at the

local level of the mobile device or SIM card. In the case of M-PESA, though, even this is locked down.

Due in large part to its malleability, Norris (2001) called the Internet the “medium of choice par excellence”, but as Kleine (2011) has correctly argued, “specific applications are more directionally defined.” She conceptualizes the *determinism continuum* as an analytical tool on which technology can be placed “based on the degree to which the spectrum of user choices is already pre-determined by the technology” (Kleine 2011).



**Figure 9. The Determinism Continuum from Kleine (2011)**

M-PESA, with its very limited malleability, rests firmly towards the ‘closed’ end of the continuum. Most of the literature on the adoption of M-PESA is focused on the individual user and thus misses the influence of this limited malleability. Because the network power of M-PESA increasingly

compels organizations, not just individuals, to adopt the standard, the limited malleability brings costs upon the new adopters.

This limits the ability of organizations to adopt M-PESA and reap the benefits of the large financial network. Some organizations “have found that M-PESA transaction records are not sufficient for their documentation needs, and are thus limited in their ability to link to M-PESA” (Haas et al. 2010). These organizations are either going to be excluded from the network, and therefore increasingly marginalized, or they must adapt their internal processes to the M-PESA standard. As with other forms of branchless banking, this offloads costs onto users and merchants. Researching the issue in the Philippines, Pickens (2009) estimated that “the vast majority of the approximately 750 rural banks will need an IT overhaul or major upgrade to participate” in mobile money. In situations of limited choice, this cost forced upon organizations is not a desirable distribution of costs and benefits.

Minimizing the cost to those organizations that are compelled by network power to join M-PESA is possible. In order to incorporate a commercial entity, M-PESA has already unilaterally upgraded the technology, but this was in order to interoperate specifically with another system (“IFC Three...”). The M-PESA standard remains closed to piecemeal revision by users due to its proprietary nature. In ways, this limits the potential for mobile money to be widely used. Because it is impossible for a single entity like Safaricom to understand the diverse needs of each organization adopting M-PESA, a more malleable and open architecture would allow for

autonomous revision (Raymond 2011). This raises concerns, however, not only with regard to security of the standard, but also its coherence. As Grewal writes, “forms of social coordination are difficult to alter once in place because they manage interdependent expectations.” So, although the lack of permissiveness has downsides, completely unfettered acceptance of contributions could serve to undermine M-PESA’s usefulness, which arises, in part, from relative stability.

An appropriate solution may be an Application Programming Interface (API). An API is a technical specification that may be added to a given piece of software in order to allow other software to access services and resources. In essence, it serves to define the “routines, data structures, object classes, and protocols” (“API”) used to communicate between different software. Strictly speaking, a standard is not more malleable with an API than without. An API is an extension, not an alteration, of the standard, but in the case of M-PESA, it may serve the same function that increased malleability would: lower cost of adoption for institutions.<sup>10</sup>

An API is really a form of interoperability between the mobile money standard and the standards of adopting institutions. By providing a clear, sophisticated method for connecting existing practices, such as customer

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<sup>10</sup> In contrast to non-proprietary software standards, in the case of an M-PESA API, Safaricom would maintain what Castells (2009) calls “the most crucial” form of modern power, “networking power.” He defines networking power as “(1) the ability to constitute network(s), and to program/reprogram the network(s) in terms of the goals assigned to the network; and (2) the ability to connect and ensure the cooperation of different networks by sharing common goals and combining resources...”

management software or billing protocols, an API would reduce the onus of adoption that is currently placed on those who find mobile money necessary but cumbersome, such as the MFIs mentioned above. Without it, organizations like Bridge International Academies, an educational institution that uses M-PESA for tuition, “has had to develop its own interface to the M-PESA website” (Mas 2010). As argued above, in cases of great network power, the distribution of costs and benefits can be inequitable, but increased interoperability, such as through an API, will lessen the cost of standardization with the added benefit for Safaricom of more users.

#### **INTEROPERABILITY**

The issue of interoperability is central to mobile money’s impact on development, freedom, and domination, but it has only begun to receive sustained attention in 2011. Like the entire paper, this section is less interested in the commercial, technical and regulatory issues at play with regard to M-PESA interoperability specifically (though they will inevitably arise), but instead aims to elucidate more general trends and abstract principles through the lens of M-PESA.

Any discussion of mobile money interoperability must begin with the question “with regard to what?”. In discussing an API, M-PESA was seen as incompatible with the existing internal standards of institutions, but mobile money could feasibly interoperate with a variety of standards used by other

networks, such as traditional banks, the payment card systems, ATMs, and even other mobile money services, including their cash agents.<sup>11</sup>

Slowly, M-PESA is beginning to interoperate with other standards. In 2009, M-PESA partnered with PesaPoint to allow customers to withdraw cash from Kenya's largest ATM provider (Rosenberg 2009). Since 2010, the M-KESHO service has linked the M-PESA standard to Equity Bank's network (Juma 2010). More recently, in early 2011, M-PESA linked with VISA to create a prepaid card, loaded via M-PESA, that works at any of the 28 million retailers worldwide that accept VISA ("M-PESA Prepay...").

By radically expanding the number of use opportunities for M-PESA customers, these examples of interoperability have augmented the network power of M-PESA, but some forms of interoperability may actually reduce the network power of M-PESA. From the beginning, M-PESA users could send money to non-users, but doing so "remains complex and costs 10 times more than the price of sending money within a network" ("Safaricom Rivals..."). While this creates a strong incentive to join M-PESA, the fee can be avoided through a form of informal interoperability: because M-PESA runs on the removable SIM card, it is possible for an individual to switch between multiple mobile money providers in order to avoid higher fees. This is a check on M-PESA's dominance, but the inconvenience of doing so and the

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<sup>11</sup> The dynamics and incentives for each type of interoperability will differ, so speaking generally about 'interoperability of mobile money' may be error prone.

enormous existing number of M-PESA users means it is a very modest form of counter-power.

A more influential means would be formal interoperability between mobile money providers. As Bellis and Nagel (2009) writes,

Interoperability between networks reduces the impact of network effects on competition. If customers on one network are able to transact with customers on a second network, an individual's choice of service provider will no longer be determined by the number of customers on that network.

Indeed, Airtel Kenya has proposed a clearinghouse that would connect all mobile money providers (Mark 2011). An additional level of interoperability would unify the agency networks to avoid redundancy. This interoperability would significantly lower the cost of building mobile money infrastructure, likely allowing for lower prices being passed on to consumers ("CBK Rules..."). However, Safaricom has invested significantly in all aspects of the M-PESA standard, from agency networks to specialized software, and is loathe to relinquish the competitive advantage it has (Price Wars...). The Central Bank of Kenya has publicly sided with Safaricom, saying that a mandate to interoperate amongst proprietary standards is likely to reduce the incentive to innovate in the future ("CBK Rules...").

Others, too, have worried that "Interoperability mandated in the wrong circumstances could reduce the incentive for mobile operators to offer mobile money services, thus stunting the opportunity to leverage the mobile for achieving the governments' financial inclusion objectives" (Bellis & Nagel 2009). These authors suggest that the disincentive will be stronger at early

stages of mobile money, when most of the investment is still needed, but they caution that interoperability may not be needed because, "If operators are strongly competing for the market, this could still imply benefits for consumers."

The approach taken in this research, though, differs. While firms will compete and customers will benefit, the appropriate development impact of mobile money will be limited if dominance, driven by network power, limits the freedom of individuals. However, freedom and dominance exist along a spectrum and regulators need to balance the benefits that come from widely adopted mobile money with the costs of that scale. Houpis and Bellis (2007) provide an intelligent recommendation that "during the early stages of branchless banking development... policy makers should merely ensure that interoperability is technologically feasible, while also ensuring they have both the necessary information and regulatory power to intervene when there is evidence that a dominant position is being exploited."

Additional clues for policies that will enhance freedom through interoperability come from the Spanish experience where mobile money was required to be launched only when participants were technically ready to interoperate, advertising made clear the interoperability, exclusive retail agreements were banned, alternatives allowed, interchange fees monitored, and the technology was neutral with regard to applications (Mas 2010). However, competition from existing financial infrastructure, a lack of marketing, and no clear demand made the Spanish experience a failure,

underlining the difficulty of mobile money generally, and partnerships and regulation, specifically.

Despite these difficulties, one of mobile money's closest observers and most influential supporters, Ignacio Mas of the Bill & Melinda Gates Foundation, has forcefully argued that the interoperability of mobile money standards and agents is firmly in the interest of the providers. For Mas, interoperability will increase the availability of mobile money, meaning more people will use it. Additionally, he believes that providing greater choice, through the ability to interconnect, will make users less likely to hold multiple SIM cards, thus reducing customer churn. Finally, Mas believes interoperability will significantly reduce the need for cash which he says,

is the enemy of mobile money because it forces operators to share almost half of mobile money revenues with retail stores whose only job is to provide backward compatibility with the legacy payment system that poor people are on – cash. Take cash out, and mobile money could be so much cheaper and so much more profitable (Mas 2011).<sup>12</sup>

Mas's case for interoperability raises a more fundamental fact about the dominance of mobile money. Thus far, M-PESA has embodied the dominance due to its first-mover advantage in actualizing network effects. Interoperability would reduce the barriers to price and feature competition that M-PESA's network power has accrued, thus making alternative mobile money services more accessible through lowered switching costs. But formal

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<sup>12</sup> Liquidity management (i.e. cash movement) is the number one expense for agents. With taxes and fixed costs, the return on investment for M-PESA is 97 percent, as opposed to selling airtime, where it is 373 percent (*Agent Economics: M-PESA*).

interoperability of mobile money would actually serve to increase the network power of mobile money in general. Connecting Safaricom's mobile money services with the competition would create an even larger network, meaning that the reasons to adopt mobile money, regardless of the provider, would be even more driven by extrinsic reason and indirect force.

In this case, the relevant answer to the question of 'interoperable with regard to what?' becomes 'cash'. Thus far, mobile money's interoperability with cash has been assumed, but the idea of a 'cashless' society may well be more than rhetoric. And while it is folly to take a teleological approach to technology (Edgerton 2007) where legacy standards (i.e. cash) are made completely obsolete by new innovations (i.e. mobile money), and, indeed, financial lives are usually highly variegated "mosaics" (Ruthven 2002), general trends are certainly discernable. Just as payment cards displaced consumer checks in the United States, increased adoption of mobile money in developing countries may displace cash (Hunt 2003).

Some have welcomed that prospect ("Killing Cash"), denouncing the high cost that arises from cash (both in terms of physical transportation and risk) (Mas 2011). If one takes seriously worries that financial inclusion will serve to "tie the poor ever more closely in to unstable financial markets" (Manji 2010) or that development is being "financialized" (Roy 2010), then the fears are only exacerbated by this prospect.

But cost cutting, as well as the ability of businesses to digitize transaction records and track payments, reduce losses, and enhance

productivity (Williams & Torma 2007), are influential drivers of network power. This will change not only the social relations mentioned above, but also the anonymity of financial transactions. Economically, retail agents – who have done much to drive the positively reinforcing cycle of M-PESA’s network power – could start to see their business, perhaps unsustainably, such that cash-in/cash-out agents would be difficult to find (Pickens et al. 2009).

The private provision of money has profound implications about the role of the state that go beyond the scope of this paper. However, two brief points are worth mentioning. One is that the incentives of mobile money providers will change with time. While interoperability with cash is necessary at an early stage, beyond a certain point, “compatibility will defuse network power by allowing users of non-dominant standards the benefits of cooperation with members of the dominant network without the need to use the network’s standard” (Grewal 2008). For profit-maximizing firms, the cash ‘loophole’ could become a liability. The second point is that there is good reason to support government oversight and support. As highlighted above, concerns about monopoly raise well-known roles for government, but insofar as the state is concerned with maximizing the development potential of its people, minimizing domination is essential. Pettit says that,

Domination overall is likely to be more economically and usefully reduced if there is a distinct, nondominating agency - presumptively, the republican state - that successfully establishes a suitable range of empowered choice for all, reducing the capacity of others to interfere in anyone's region

of empowerment: in effect, disempowering choices that would threaten that privileged zone (Pettit 2006).

Although imperfections in the democratic practice of states certainly exist - including documented regulatory capture in East African financial inclusion legislation (Manji 2010) - flaws in public recourse, accountability, and transparency are more justifiably improvable than in firms that answer solely to their shareholders. With the risk of regulatory capture, governments should not be expected to set standards, but can play a convening role to overcome collective action problems. Models of public-private partnership should be encouraged so that the strengths of both are maximized (Garcia et al. 2005). As mobile money matures in additional contexts, comparative work on the institutional arrangements most likely to enhance human freedom will be timely and constructive.

## **VIII. Conclusion**

A straightforward question - *what is the impact of M-PESA on human freedom?* - led to a vast and variegated terrain. The root of much of this complexity is the paradoxical relationship of networks of social interaction with individual freedom. The need and desire to coordinate - in this case, financially - requires standardization. Following Grewal (2008), this convergence on a standard, in union with subsequent desertion of alternatives, has been identified as a form of power that acts on all Kenyans, both M-PESA users and not.

Rather than abstract aversion, though, power should be assessed in its interplay with freedom. Although a contested notion, this research has primarily adopted Amartya Sen's theory of freedom because it is both a comprehensive theory of development and one that is especially well suited for application to the field of ICTs and development (Kleine 2010). Even within Sen's capabilities approach, the complexity of assessing M-PESA was clear: empowerment arose through large-scale coordination, but the interdependencies of networked life have resulted in new problems of entanglement. While a diversity of options is a philosophical ideal, in practice, the close study of M-PESA has shown that freedom to achieve one's self-set goals can be fruitfully expanded through standardization.

As developing countries make this transformation, it is important to ensure it is not Faustian. Philip Pettit's theory of freedom as non-domination can be considered an important corollary to the insights of Sen and Grewal. By emphasizing that interference, both actual and potential, from an arbitrary third-party is a form of unfreedom, Pettit's approach draws into question the form of liberty present in the relationship between Kenya's newly empowered mobile money users and the providers of those services. A sure sign of the dependence of the former and dominance of the latter is the fact that fully 92 percent of M-PESA users expect a large and negative effect from M-PESA shutting down (Jack & Suri 2011). Because M-PESA is provided as a for-profit enterprise, it is unreasonable to expect Safaricom to demur

from well-earned success or to pursue interests other than that of their stockholders.

Despite this gross inequity in power to dominate, it would be unwise to eagerly presume that the relationship between Safaricom and Kenyans is one not characterized by mutual benefits. For one, Safaricom has a long history of social responsibility and is keenly aware of the need to track its users interests. Secondly, the intricacies of industry oversight, regulation, and accountability risk upsetting a rapidly developing sector that is providing considerable benefits.

However, the goal of development sets a high bar, especially when formulated comprehensively. Efforts should be made to limit the domination arising from the network power of mobile money while maximizing the benefits to human freedom. The specific policies and practices necessary will be contextual and evolutionary, but will likely rotate around the three properties of standards through which counter-power can be exercised: availability, malleability and compatibility.

The perspective of development as freedom can both valorize and critique; the case of M-PESA shows this very well. Too often, approaches to ICTs fall prey to two failures. For one, they often privilege the technological artifact, leading to a form of determinism that is void of context. While it is true that technology does have certain affordances, it is far from autonomous. The theory of network power firmly demonstrates how social forces, most obviously human coordination, influence technological

progression. Secondly, many approaches to ICTs presume an expansion of human freedom (Mansell 2002). This research took seriously the possibility of the converse, probing for ways in which mobile money may actually serve to curtail development as freedom. What it found was a diversity of implications, some empowering, some restraining. Although most mobile money services are currently too small to exhibit the network power and domination that M-PESA does, the theories applied above – network power, development as freedom, freedom and non-domination – can be fruitfully applied to other networked standards. As donors, policymakers, and individuals continue to encourage and adopt ICTs, it would be responsible to do so realistically, with awareness of the dual nature and the ways in which downsides can be minimized while benefits enhanced.

**APPENDIX A: LITERATURE REVIEW SUMMARY**

No.	Title	Authors	Year	Peer Review	Methodology	Country
1	Micro-Payment Systems and Their Application to Mobile Networks	Wishart	2006	No	Descriptive	Philippines, South Africa, Kenya
2	Using Technology to Build Inclusive Financial Systems	Ivatury	2006	No	Mixed	Global
3	Mobile Phone Banking and Low-Income Customers: Evidence from South Africa	Ivatury & Pickens	2006	No	Quantitative	South Africa
4	Branchless Banking 2010: Who's Served? At What Price? What's Next?	McKay & Pickens	2010	No	Quantitative	Global
5	"Trust and Fidelity: from 'Under the Mattress' to the Mobile Phone."	Williams & Torma	2007	No	Qualitative	South Africa, Kenya, Philippines
6	The Early Experience with Branchless Banking	Ivatury & Mas	2008	No	Qualitative	Global
7	Mobile Phone Practices & The Design of Mobile Money Services for Emerging Markets	Chipchase	2009	No	Qualitative	Global
8	Mobile banking and economic development: Linking Adoption, Impact, and Use	Donner & Tellez	2008	Yes	Qualitative	India
9	Airtime Transfer Services in Egypt	Goodman & Walia	2007	No	Quantitative	Egypt
10	Shared Phone Practices: Exploratory Field Research from Uganda and Beyond	Chipchase & Tulusan	2007	No	Qualitative	Uganda
11	Surviving in the Dual System: How M-PESA Is Fostering Urban-to-Rural Remittances in a Kenyan Slum	Morawczynski	2008	Yes	Qualitative	Kenya
12	Examining the Usage and Impact of Transformational M-Banking in Kenya	Morawczynski	2009	Yes	Qualitative	Kenya
13	Poor People Using Mobile Financial Services: Observations on Customer Usage and Impact from M-PESA	Morawczynski & Pickens	2009	No	Qualitative	Kenya
14	New Ways to Strengthen Old Ways: M-PESA and Informal Finance	Rutherford	2010	No	Qualitative	Kenya
15	Window on the Unbanked: Mobile Money in the Philippines	Pickens	2009	No	Quantitative	Philippines
16	The Economics of M-PESA	Jack & Suri 2011	2009	No	Quantitative	Kenya
18	Community-Level Economic Effects of M-PESA in Kenya: Initial Findings	Plyler, Haas & Nagarajan	2010	No	Qualitative	Kenya
19	Outreach of M-PESA System in Kenya: Emerging Trends	Haas, Plyler & Nagarajan	2010	No	Qualitative	Kenya
20	The Mobile Money Movement: Catalyst to Jumpstart Emerging Markets	Gencer	2011	No	Descriptive	Global
21	Amplifying the Impact: Examining the Intersection of Mobile Health and Mobile Finance	Gencer	2011	No	Descriptive	Global

**APPENDIX B: IMPACT OF MOBILE MONEY ON SEN'S INSTRUMENTAL FREEDOMS**

**Impact of Mobile Money on Instrumental Freedom**

POLITICAL FREEDOM		
<i>Study</i>	<i>Impact</i>	<i>Notes</i>
N/A		
ECONOMIC FACILITIES		
<i>Study</i>	<i>Impact</i>	<i>Notes</i>
1	Increased average revenue per user for MNOs	
3	Basket of banking services cost 33% less	Users tended to be the better-off
4	Branchless banking significantly cheaper; M-PESA 1/3-1/2 cheaper	
5	Informational asymmetry reduced, leading to financial inclusion	Not systematic evidence
5	Decreased time and money spent traveling	
6	Cost reduction for both financial provider and customer	Notable lack of poor, unbanked users and advanced financial services
9	Increased affordability and access to mobile telephony	Arose from balance transfer service used informally as mobile money
9	Additional income opportunity to entrepreneurial users	Arose from balance transfer service used informally as mobile money
11	Reduced risk of theft	
11	Enhanced rural income, stimulated rural demand, and reinforced social capital <sup>13</sup>	Facilitated urban-rural remittances which have these instrumental impacts
12	Used for "livelihood strategies" to cope with shocks	
12	Increased women's economic capability	"Secret" savings in M-PESA reduced need for husband's permission
13	Increased income for remittance recipients after adopting M-PESA	Small sample of 70 out of 77 households
15	½ of adopters were previously unbanked	Large representative sample of the Philippines

<sup>13</sup> Many of these impacts, such as social capital accumulation, are important in each category.

17	Previously unbanked users were adopting in large numbers	From a nationally representative survey of Kenya
17	81% of users were saving with M-PESA	From a nationally representative survey of Kenya
18	Local economic expansion, capital accumulation, and business environment improvements	From qualitative survey
19	Existing businesses becoming M-PESA agents experience business growth	From qualitative survey
20	Thousands of jobs created via M-PESA industry	
20	GDP growth	Speculative study, but well-grounded in theory
<b>SOCIAL OPPORTUNITIES</b>		
<i>Study</i>	<i>Impact</i>	<i>Notes</i>
9	Enhanced existing social networks of support	Arose from balance transfer service used informally as mobile money
21	Improvements in the delivery of healthcare	Speculative approach, but well-grounded in theory
<b>TRANSPARENCY GUARANTEES</b>		
<i>Study</i>	<i>Impact</i>	<i>Notes</i>
N/A		
<b>PROTECTIVE SECURITIES</b>		
<i>Study</i>	<i>Impact</i>	<i>Notes</i>
12	Reduced vulnerability through solicitation of capital and maintenance of social networks	
12	Allowed money transfer to urban areas paralyzed by post-election violence	Limited the shock of post-election violence
17	22% of M-PESA adopters used it in emergencies	From a nationally representative survey of Kenya

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