Final report

Interoperability of mobile money: International experience and recommendations for Mozambique

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Final Report (28/12/2016)

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1. Interoperability in Mobile Money

1.1 Mobile money

The introduction of mobile money is revolutionizing the financial sector of many developing countries. First created as a means to facilitate money transfers in Kenya, it is transforming itself into an alternative to the formal banking system, which remained closed to the poor, that has the potential of reaching out to the whole population.

We first clarify some concepts repeatedly used in this report. By *mobile money* we mean money held in accounts (*mobile wallets*) with mobile telephony operators. It is a specific form of *electronic money*, i.e. money that is held in electronic form. This also includes traditional bank accounts, which give access to debit and credit cards, savings and credit, and *banking wallets*. The latter are simple accounts created by commercial banks that only allow for money transfers and cash-out at ATMs. While all three types of accounts can be accessed via mobile phones, we reserve the term *mobile money* for accounts hosted by mobile telephony operators.

Several factors pertaining to each country will determine whether the reach of mobile money will live up to expectations. Foremost is the local culture and actual need for a mobile money solution that is felt by the population. The two extremes in this respect are given by Kenya, where M-Pesa arose from an improvised airtime-as-money remittance scheme invented by Safaricom's customers, to South Africa, where the number of formal bank accounts is so high that mobile money never took off, and in 2016 both M-Pesa and MTN decided to close their operations.

A second factor is the attractiveness of the mobile money solutions. This includes pricing and possible related services (international transfers, merchant payments, saving, loans, insurance), but it also depends on the size of the network of other people that mobile money customers can transfer money to and receive from. This network size increases substantially if different mobile money operators are

interconnected to each other and to the banking system, which is called *interoperability*.

As reported by the GSMA (GSMA 2015 SOTIR), "… as of December 2015, almost two-thirds of markets where mobile money is available have two or more live mobile money services (60 of 93 markets) and more than one third have three or more live mobile money services (35 markets, with a median of five services per market)." By mere numbers of operators, there is thus a large scope for the introduction of interoperability, which indeed has started recently. In 2012, it was mandated in Nigeria, in 2013 and 2014 it was implemented in Indonesia, Pakistan, Sri Lanka, and Tanzania, and in 2015 in Madagascar, Rwanda, and Thailand. The Philippines, Madagascar, Mexico and Peru followed more recently.

Dozens, if not hundreds of studies, many of them cited in this report, have been written about the *prospects* of mobile money, but the actual *evidence* of what works and what does not is still rather thin. This report focuses on the available evidence on creating interoperability and attempts to organize it according to the regulatory approach taken. What until now is completely absent in the literature is hard evidence on how strongly interoperability increases mobile money penetration and financial inclusion. Given that the introduction of interoperability is still very recent, this evidence will only be available in a few years' time.

In this report, we first review concepts and recent developments. As a second step we present country-specific information for cases where interoperability has been introduced or at least attempted. Then, we describe the mobile money market in Mozambique and give recommendations for the introduction of interoperability. Throughout the text we indicate the sources of different facts or statements in the literature and often reproduce the latter *verbatim* in order not to distort the original message.

1.2 Concepts of interoperability

Several concepts of interoperability are relevant and need to be distinguished because their implications for regulation and business models differ.

The most important concept is *account-to-account* (A2A) interoperability. According to GSMA (2015 SOTIR) it stands for "interoperability between mobile money accounts from different providers and between mobile money accounts and bank accounts." It therefore includes *person-to-person* (P2P) interoperability, i.e. the possibility for customers to make transfers between their mobile money accounts, as well as *bank account to mobile money account* (B2M) and *mobile money account to bank account* (M2B) transfers.

A rather different issue is *agent interoperability*, where mobile money agents are allowed to handle the transactions of multiple mobile money operators. This may or may not involve the usage of a joint float account to mitigate liquidity risk.

In the context of A2A interoperability between mobile money operators, Benson and Loftesness (2012, p. 32) further distinguish between *scheme interoperability* and *network interoperability*. In the former a unique scheme and brand is created (comparable to the Visa brand for card payments), while in the latter each mobile money operator maintains its separate identity and system while allowing for transfers. They also coin the term *parallel systems interoperability*, by which they essentially mean agent interoperability. They conclude that parallel systems and network interoperability would realize most benefits of true scheme interoperability.

Two further concepts are *business-to-consumer* (B2C) and *government-to-person* (G2P) interoperability, which essentially refer to the possibility of mobile money transfers from companies and the government to mobile wallets, thus cutting out middlemen and making sure that the final recipients actually receive salary and benefit payments.

World Bank et al. (2014) state:

"Interoperability of bank and nonbank financial service providers: Making digital payments cost effective and sustainable for low-income, rural populations will require leveraging new technologies such as mobile phones, ATMs, POS terminals, and online services. Equally important, it will require ensuring that digital payments can be made across the many parties that people deal with financially, such as friends and family, employers, merchants, schools, utilities, and governments. No one provider or sector can justify an investment in all of these elements or handle the contractual requirements of dealing with so many players. Rather, multiple players must be able to interconnect where necessary to provide individuals with a wide range of services, and must be able to do so on fair and equitable cost and access terms." (p. 10)

In this report, unless specifically indicated otherwise, we will concentrate on A2A interoperability, as it presents the largest potential benefits and simultaneously the largest challenges from a regulatory point of view.

1.3 The benefits of interoperability

1.3.1 A2A interoperability

GSMA (2014 SOTIR) defines interoperability as the ability for customers to undertake money transfers between two accounts at different mobile money schemes, or to transfer money between accounts at mobile money schemes and accounts at banks. GSMA (2015 SOTIR) add that by allowing customers to transact between different mobile money schemes, A2A interoperability aims to increase the value of mobile money for providers and customers alike, including a larger addressable market and enhanced customer experience.

The GSMA (2014) Mobile Money Interoperability Programme underlines that focus should be on A2A interoperability because of the potential for strong network effects! The GSMA also highlights the key functional requirements for A2A interoperability as the ability to:

- Directly transact between wallet accounts at different MMOs;
- Directly transact between mobile money accounts and bank accounts;
- Settle the funds for transactions across schemes and between schemes and banks;
- Implement common risk management practices that preserve the integrity of the individual mobile money schemes.

Clearly the purpose of these requirements is to maximize both network effects and trust in the system. Either one is necessary to convince potential mobile money clients to actually sign up and keep money in their mobile wallets.

The main objective of advancing interoperability of mobile money operators is to increase financial inclusion of the poor and unbanked. As the reach of mobile telephony networks is much larger (and increasing) than that of the formal banking sector, mobile money certainly offers the prospect of a low-cost solution to create access to the financial sector. Interoperability is bound to help in two aspects: First, it substantially improves the value proposition of mobile money, by increasing customer benefits. Second, it reduces the cost of actually reaching the most outlying parts of the population through the agent network.

Without interoperability, originators and recipients of transfers need to visit multiple agents to make transactions with different networks and must cash out or in, each of which is subject to fees. If networks are interconnected, fees are expected to be lower and money can be kept in mobile wallets. Thus, transactions are cheaper and more other people can be reached, which will increase the number of transactions (CGAP 2014). At present, vouchers are another way to transfer funds from one mobile money system to another, but this choice will become obsolete with more interoperability (Murphy 2014).

From a market perspective, the essential issue in creating a viable mobile money ecosystem is to guarantee network effects that are strong, in particular in order to overcome the typical chicken-and-egg problem of network markets: As long as there are only few users, the service is not very attractive to other potential users; but once a critical mass of users is surpassed, its perceived value increases strongly and subscriber growth takes off. P2P interoperability has the potential of speeding up the development of the mobile money market by avoiding that multiple networks each need to reach their own critical mass: Instead, joint subscriber numbers do so much more easily.

B2M (bank-to-mobile) and M2B (mobile-to-bank) interoperability with the formal banking sector provides another important avenue to raise the potential benefits from mobile money. Apart from the obvious advantage of allowing mobile money customers to interact directly with banks, there are potentially important indirect ones. Interoperability with banks creates links to the formal payment sector, which brings in more high-value customers and increases the liquidity of the overall system (GSMA SOTIR 2013); it allows for the introduction of more services and financial services related to mobile money accounts; and bank and mobile interoperability are ever more important to close gap between the banked and unbanked population (GSMA 2015 SOTIR).

The latter report also states that B2M and M2B transactions are becoming more important (mobile cash-outs from bank accounts in particular), and that between 2013 and 2015, the number of banks connected to mobile money schemes increased by 66%, to 520 banks with 120 mobile money schemes (see also Pasti and Vonthron 2015a). Thus, mobile-banking interoperability arrangements actually vastly outnumber those between mobile money operators.

A further benefit of interoperability is found on the supply side, in particular the agent network. It represents a large fixed cost, because agents need to be recruited

and trained and the network needs to be maintained and provided with cash. The agents themselves need a minimum number of customers and enough liquidity to be viable. Representing multiple networks then reduces the riskiness of cash flows and reduces the agents' cost of holding enough money. Thus sharing of cash-in/out points by interoperable networks will increase the reach of the agent network as compared to separate networks. CGAP 2014 reports that a survey performed by the International Finance Corporation (IFC) found that both agents and customers in Tanzania are in favor of interoperability.

Jackson (2016) argues that extending agent networks to the poorest regions is not realistic because each agent would have to serve very large numbers of small-value transactions in order to be viable; he concludes that these large numbers are unlikely to arise. Agents would rather locate in wealthier areas and do a smaller number of higher-value transactions. Following his logic, interoperability creates an opportunity to bundle more transactions on a smaller number of agents, which improves their viability and therefore should increase the reach of the agent network.

Another supply-side advantage arises from the fact that interoperability creates a more balanced playing-field for mobile money operators. This makes it more attractive for operators to explore possibilities to differentiate their offers, for example by creating additional services. More differentiation benefits consumers and further increases the attractiveness of mobile money services.

As G20 (2016, p. 13) puts it:

"Open digital platforms can also improve interoperability and widen consumer choice by expanding the network of available access points for consumers and service providers to conduct transactions and provide cash-in/cash-out services. Such access points would include not just branches and agents, but also ATMs, points of service (POS) devices, mobile phones and Internet applications. …. Modernize and expand the retail payments system infrastructure and establish open

payments platforms linked to countries' clearing and settlement systems and that provide safe and efficient access to banks, non-bank financial institutions, and emerging service providers."

1.3.2 Agent interoperability

Agent interoperability offers some of the same benefits as A2A interoperability. GSMA (2015 SRS) states that costs can be shared, which extends the reach of the service. Agents can serve customers from different providers using one float account, which also reduces the liquidity risk. It is common that agents have to refuse operations because of lack of float (Wright 2014), so that the bundling of accounts and the accompanying mitigation of liquidity risk will increase customer satisfaction and the uptake of mobile money.

Some countries have followed this path. In Kenya, Safaricom allowed agent interoperability in 2014, by giving access to Airtel to its network of 85,000 agents. Shortly afterwards, the Competition Authority of Kenya imposed agent interoperability between all networks.

GSMA (2015 SRS) reports that in Chad, the most significant determinant of success was whether a rural agent offered Airtel Money in addition to Tigo Cash. Phone interviews with rural agents revealed that 70% of the Tigo Cash agents who were classified as successful offered both Tigo and Airtel access, while only 51% of the unsuccessful agents did so. If agent success is indeed caused by offering access to both networks,[1] this implies two observations: i) Agent operability increases the chances that a larger agent network is viable, ii) but on its own offers no guarantees.

[1] In principle, it is also possible that successful agents are more likely to be approached by Airtel representatives, implying the reverse direction of causality. The only way to determine its actual direction is to investigate directly with stakeholders, since simply reporting a statistically significant relationship between two variables does not imply causality in either direction.

1.3.3 Government-to-person interoperability

Interoperability also helps to make G2P (government to person) and B2C (business to consumer) payment schemes feasible, for salary payments, subsidies, etc., for two reasons (Almazan 2013): First of all, interoperability increases the number of beneficiaries that can be reached through a single payment scheme; that is, the government will not have to direct payments separately through all different mobile money operators, but rather can operate through a reduced number.

Second, G2P transfers can also have the effect of tipping the market in favor of one operator in the absence of interoperability (CGAP 2011): If the government sends salaries or subsidies through this operator only, then given the large number of recipients this can easily make most other customers join the same network. Interoperability in this case helps to keep a balance between multiple operators in the market, even if the volume of G2P transfer were large relative to the market.

There is one important drawback to using G2P transfers as an accelerator to mobile money, though: Payments are mostly one-way and money may be cashed out instead to being held in e-wallets if trust in the system is low or there is no other obvious use inside the system. This puts a high burden and large liquidity drain on agents and may therefore hinder rather than advance the roll-out of the agent network. Thus, G2P payments might not be tenable as a principal business and should only be introduced when the agent network is already strong and interoperability reduces liquidity risk.

1.4 The challenges to interoperability

While interoperability is expected to offer benefits to consumers and at the market level, its introduction faces several challenges.

1.4.1 Technical standards and coordination

A first type of challenge to creating interoperability consists of the need to define and enforce a common set of rules and standards, both in the technical and legal realm. Kaschula (2014) lists the following common challenges to interoperability:

- Lack of a common definition of what becoming interoperable is, resulting in confusion within the industry as different operators have different ideas about what it is.
- The benefits associated with interoperability are not always immediately clear, with the true impact of interoperability being proven as the first cases are deployed.
- Mistrust amongst competitors can make it difficult for operators to collaborate even when the benefits of interoperability have been understood.
- Understanding and agreeing to a technical and commercial model to govern the interoperable process.
- Conflicting organizational priorities can result in the desire to becoming interoperable being set aside for a time.
- The imposition of unfavorable regulatory regimes for mobile money and interoperability.

While Nigeria mandated all mobile money operators to join a national switch by the beginning of 2013, reportedly nothing much has happened. Tanzania, on the other hand, has undertaken a huge and well-coordinated effort to bring all operators to the table and find a common agreement that all would adhere to. An important take-away is that finding a proposition that creates value for all operators is a large step for advancing their interconnection.

Kaschula (2014) continues to state that a common switch, with its own set of rules for participation, technical and operational issues, improves coordination and customer experience, and allows for a much faster implementation of interoperability, as compared to private switches or bilateral agreements.

A set of clear rules is essential to create trust in the mobile money network. At the same time, care should be taken to leave the necessary flexibility so that new technological developments can be taken into account, both at the design stage and later at the operating stage.

1.4.2 Dominant firms

Firms with a strong first-mover advantage, due to an early start and significant investments in rolling out their agent network, are understandably reluctant in opening their network of customers and agents to small competitors, as this reduces their competitive advantage. CGAP (2011) and GSMA (2014) argue that voluntary interconnection is more likely to happen if mobile money networks are still small and of similar size; if one network is larger (for example, the first mover) then it has less interest in interconnecting with others.

While the short-run effect seems to be negative for this operator, in the medium run agreeing to interoperability brings advantages, especially if the overall growth potential of the market is large. It may simply be better to be a less-than-dominant operator in a large market than a dominant one in a small market.

From a market perspective, a refusal of interoperability by the largest operator can result in a lack of competition, in particular if the number of viable candidates for agents is limited (CGAP 2011): It may be too costly for smaller networks to create their own separate agent network. Thus the refusal of interconnection can freeze a very asymmetric market structure, to the detriment of mobile money customers. In this vein, Benson and Loftesness (2012) state that early dominance of one operator (such as Safaricom in Kenya) can mean that other operators cannot reach critical mass even if they decide to interoperate among themselves, and so the dominant operator may refuse interconnection. In this case, it is unlikely that interoperability among wireless carriers will be achieved without direct government intervention.

Mas (2011, p. 78) puts this very clearly:

> "Larger and more advanced Mobile Money providers see interconnection as a concession of value to their laggardly competitors. That may be true to a larger or smaller degree, but what they should be focusing on is how to maximize the lock in of their customers to their Mobile Money service. Lock-in is a function of two things: the probability that customers will join the scheme, and the probability that they will choose not to leave. Interoperability helps lock-in by increasing the incentives to join (you can send money to more than just that 12.5% minority). Interoperability may reduce lock-in by making it easier for customers to leave, if they feel that other schemes can deliver on an equally large network."
>
> "… It's always hard for competitors to decide to work together on some key aspects of their business. It usually comes down to whether the players involved opt to maximize the total size of the pie or just their slice of the pie. In networked businesses, in general, the more the players work together to enlarge the pie, the larger the slice each one will get. That's why mobile operators have a tradition –of which they are rightly proud– of interconnecting their voice and data bearer services. They long since discovered that their customers are best served by making sure they can send and receive messages to/from anyone, even if they are on a different network. But we haven't yet seen this logic extend to Mobile Money. In most countries, the prospect of providers working together is probably less a matter of if than when- just as it has been for banks sharing ATMs and mobile operators sharing towers. That being the case, it's probably not even about when but about how. This will be the path for ecosystem development."

1.4.3 Investments

Still, as pointed out by CGAP (2011), competition policy concerns must be balanced with property rights (investments in platform development and agent network) and entrants' incentives to invest. This is a difficult balance to strike, similar to concerns in many other regulated markets. Agents need recruiting, training and branding – all

of it is costly, and investments are done to gain competitive advantage. Imposing interoperability should not destroy incentives to invest in agent networks.

Tarazi and Kumnar (2012b) state: “But as with platform interoperability, regulators are cognizant that prohibiting exclusive agents could deter private actors from entering the market. What service provider would invest in identifying, training, and equipping agents if competitors can piggyback off their investment?” Platform (A2A) interoperability can mean that even with exclusive agents in practice these agents can serve customers from other mobile money networks. Thus, the agent need not be working for multiple operators. This offers the perspective of a mid-way option using A2A interoperability accompanied by voluntary sharing of agent networks.

Davidson and Leishman (2012), on the other hand, offer a pessimistic vision of interoperability. They state that there is not enough social value in cross-network payments to justify the necessary investments:

- In many markets, few customers are willing to pay a premium for the ability to transact across networks;
- It is not obvious that a policy imposing interconnection would create welfare gains for customers;
- Imposing interconnection might have the opposite effect if mobile operators raise prices or curtail investment in other areas in order to implement interconnectivity.

It is not clear, though, whether Davidson and Leishman have weighed these cons with the pros of larger network effects and the resulting growth potential.

GSMA (2015 SRS, text box 3) states that agent interoperability remains largely untested due to the persistent lack of clarity on the operational implications, business model, and strategic rationale. While liquidity management is still a major barrier even in mature markets, operators that consider their agent networks a key differentiator have yet to invest significantly in solving the practical challenges of agent interoperability.

1.5 Interoperability agreements and schemes

1.5.1 Supranational initiatives

We would first like to mention that the GSMA has undertaken as one of its policy priorities to help augment interoperability in the mobile money sector and launched a specific programme with this aim.

GSMA (2014 SOTIR) states:
"Building on our work in the Mobile Money for the Unbanked programme, in 2014, the GSMA launched the Mobile Money Interoperability programme with the support of Axiata, Bharti Airtel, Etisalat, Millicom, MTN, Ooredoo, Orange, Telenor, Turk Telekom, Vodafone and Zain. This initiative is accelerating interoperability of mobile money services by identifying and sharing best practices, guidelines and processes and providing regulatory support in a number of leading markets."

GSMA (2014 SSA) continues:
"The GSMA's global Mobile Money Interoperability (MMI) programme focuses on helping operators successfully launch and scale interoperable mobile money services by identifying and sharing best practices, guidelines and processes, creating performance benchmarks, and providing regulatory support. A number of operators from the region have committed to work together to accelerate the implementation of interoperable mobile money services, including Vodafone, Bharti Airtel, Etisalat, Millicom, MTN Group and Orange."

The GSMA clearly attempts to distribute knowledge and capabilities that make the adoption of interoperability more palpable to hesitating operators. Shortening the path to coordination agreements is an important element of this. These efforts complement national initiatives and will hopefully be useful in helping them on.

1.5.2 National interoperability initiatives

In chapter 2 below we will consider at greater depth the interoperability initiatives and experiences in different international mobile money markets. Here we will collect the main points, in chronological order.

At the end of 2012, the central bank of **Nigeria** mandated that all mobile money operators had to interconnect to a national switch. Seemingly this order was not put into practice (CGAP 2015).

In 2013 interoperability was implemented in **Indonesia** (GSMA 2014 SOTIR).

GSMA (2014 SOTIR) states that in 2014, operators in **Pakistan**, **Sri Lanka** and **Tanzania** interconnected their mobile money services. Initial data from Tanzania suggests that interoperability can boost transaction volumes (text box 8, p. 35). According to Bindo and Hasnain (2016), in Pakistan 6 out of 7 mobile money operators are connected to a national switch, which allows them to route payments to each other and to bank accounts.

GSMA (2015 SOTIR) indicates that in 2015 new A2A agreements were made, in **Madagascar**, **Rwanda** and **Thailand**. Providers in the **Philippines** are also preparing to launch interoperability in 2016, running pilot schemes in 2015 (GSMA 2016b). Additionally, mobile money services in **Bolivia**, **Peru** and **Mexico**—which are already interoperable with the banking sector— are on their way to full account-to-account (A2A) interoperability in mobile money.

GSMA (2015 SOTIR) reports that in **Peru**, a group of more than 30 e-money issuers has launched an open and interoperable e-money platform. This multitenant, interoperable, financial industry-led scheme is describe to be the first of its kind, and is based on an initiative of the Association of Banks (ASBANC) (Almazan and Frydrych (2015).

Bangladesh also has an interoperability arrangement (CGAP 2015). It is provided via a third-party platform that mobile money operators can choose to interconnect with (Anderson et al. 2015).

According to Almazan and Frydrych (2015), Mobile operators in **Paraguay** are exploring interoperability of their mobile money services, while in **Ecuador** the central government is the only issuer of e-money, as established by a legal framework issued in 2014.

Almazan (2015) explains that the central bank of **Mexico** (Banxico) established its inter-bank payments system (SPEI, or Sistema de Pagos Electrónicos Interbancarios), created in 2004 for the formal financial sector, as the de facto clearing and settlement mechanism for low-value transactions, including mobile money. It mandated the use of SPEI to settle payments among mobile payments providers, whether directly or through a connected clearing house.

In **Ghana**, interoperability has been mandated since 2008 but never took off. This imposition was repealed in 2015 (Blay 2016). The central bank announced in September 2016 that it initiated a project to implement an interoperable mobile money payment infrastructure and that it is in conversation with stakeholders about its implementation (NextBillion 2016).

Interoperability between banks and mobile money operators has been making larger strides. Pasti and Vonthron (2015a) report that 520 banks are linked to 120 mobile money schemes. B2M transactions strongly outweigh M2B transactions, as customers use bank accounts to charge mobile wallets, then either withdraw money or transfer to other mobile money users. Thus B2M interoperability helps to link the unbanked to the formal banking sector.

GSMA (2013b) and GSMA (2013 SOTIR) report that in **Zimbabwe**, the operator Ecocash has full interoperability with the banking sector due to bank-grade switch.

In a related development, in September 2016 Visa launched the **Mvisa** app for smartphones (but the system can also be used via SSID codes), a mobile money application (Quartz Africa 2016). Customers must have a bank account, but the app interoperates between different banks and mobile operators. This initiative creates more interoperability, but by its nature does not reach out to the unbanked.

The following table provides an overview over the interoperability arrangements in existence in 2015.

	Interoperability is mandated	Technical capacity for interoperability is mandated, or MNOs must have a plan to interoperate	Interoperability is encouraged or permitted	Interoperability is not regulated	Not Specified
Account-to-Account (A2A) Interoperability		Indonesia	Pakistan	Tanzania	Sri Lanka
Government-led National Switch or RTGS	Malawi Mexico Nigeria	Afghanistan India			Haiti Mozambique Zimbabwe
Non-Government Third Party Providers (platforms or agents)	Nigeria Rwanda	Lesotho Namibia	Bangladesh Kenya	Peru Nepal	Philippines Zimbabwe
Other			Kenya	South Africa	
Not Specified	Paraguay	Brazil Swaziland Uganda	Liberia Sierra Leone	Colombia DRC Ghana Myanmar Zambia	

Interoperability Regulation and Types of Interoperable Markets (Anderson et al. 2015)

1.5.3 International interoperability

International interoperability arrangements face the same kind of coordination and settlement issues as domestic interoperability arrangements (Scharwatt and Williamson 2015). But since mobile money operators in different countries are not

competing against each other, the benefits of interoperability largely outweigh the cost and therefore agreement is easier to come by.

GSMA (2015 SSA) describes recent developments: “In April 2014, MTN Côte d’Ivoire and Airtel Burkina Faso signed an agreement to interoperate their mobile money services to facilitate cross-border transfers. Orange Côte d’Ivoire and Airtel Burkina also signed a similar agreement in March 2015. In May 2015, Vodafone M-Pesa and MTN Mobile Money announced an agreement to allow customers to transfer funds between the two services. When operational, the deal will enable M-Pesa customers in Kenya, Tanzania, the DRC and Mozambique to transfer money to and from MTN Mobile Money customers in Uganda, Rwanda and Zambia.” In October 2015 MTN Rwanda and Safaricom (Kenya) signed a similar deal.

1.6 Regulatory approaches

1.6.1 The larger picture

Camner (2012) proposes a three-step process to consider interoperability:

1. Identify the perceived problem or opportunity in the market.
2. Does solving the problem bring value to both consumers and operators?
3. How could partnerships and interconnection help to achieve this objective?

According to these steps in approaching interoperability, the actual choice of the mode of interoperability comes last. The first step is trying to identify which are the primary problems and opportunities in the market. Following GSMA (2014), “It is critical that regulators create an open and level playing field for mobile money services, as there is evidence that regulatory barriers can slow down both market uptake and customer adoption.” The regulatory barriers referred to can be of various types: They can be entry barriers to non-bank mobile money operators (as

was the case in India), or they can be over-hasty impositions of interoperability (as in Nigeria and Ghana).

The second step is to determine whether the benefits of solving a specific problem outweigh the costs involved (the latter of course depend on the proposed solution), where solving the problem indeed creates significant value for customers and operators. As CGAP and BFA (2012) put it:
"Interoperability can reduce costs through greater efficiency of infrastructure deployment and may also increase competition between providers in ways which results in cost savings being passed on to customers. However, moves to promote interoperability should harness, not undermine, the business case for private providers to make investments of the required scale."

The potential for strong network effects on the demand side is essential: A regulatory intervention should only happen if the perceived benefits are high enough, and the creation of network effects is the main effect if interoperability.

The third point refers to the actual creation of interoperability, as discussed in the following section. At this point it is also useful to remember GSMA's definition of an "enabling regulatory approach", following di Castri (2013): This approach is characterized by rules established by the regulator that

- Permit non-banks to issue electronic money (or equivalent) by allowing them to:
    - be licensed directly, OR
    - set up a subsidiary for this business, OR
    - apply for a payments bank (or equivalent) license, OR
    - provide the mobile money service under a letter of no-objection to the non-bank or its partner bank, pending the approval of a specific regulation,

- AND impose initial and ongoing capital requirements that are proportional to the risks of the e-money business,
- AND permit them to use agents for cash-in and cash-out operations,
- AND do not prescribe the implementation of specific interoperability models without allowing for a market-led approach.

The first three points can be understood as referring to the first two steps identified above, that is, they point to regulatory issues whose effect may be larger than that of creating interoperability. For our purpose, the fourth point is the most interesting: An enabling approach is characterized by putting consultation and market mechanisms first, relegating the imposition of interoperability to an instrument of last resort.

GPFI (2010) highlights market-based incentives to achieve the long-term goal of broad interoperability and interconnection. Furthermore:
"Market incentives may not encourage service providers to adopt systems with the capacity for interoperability and interconnectivity. However, encouraging or requiring that all systems have the technical capacity to connect with other systems and requiring systems to be interconnected from the onset are two very different things. To encourage market innovation and new market entrants, governments should avoid regulation mandating that systems be interconnected ex ante. Instead, policymakers should monitor competition and efficiency in the market, and encourage an eventual move toward an interconnected network of individual systems. Needless to say, how this principle will be worked out in each market will be different, as the Mexican case shows."

World Bank et al. (2014, p. 13) state the following:
"In order for the private sector to be able to provide digital payments solutions, it needs the space to develop innovative payment products. This means a regulatory environment that recognizes the contributions of financial sector players other than traditional banks, such as nonbank payment services providers and mobile network

operators. These nonbank service providers and agents are important in reaching the poor, especially in rural areas."

"Providing a clear and functional regulatory framework for these new players will be important to ensure both a level playing field between the different actors in the digital payment space and adequate protection of consumer funds. To that end, regulators will have to address defining who can provide financial services and act as agents. Regulators also must find the appropriate balance between promoting interoperability and letting the market decide."

1.6.2 Mandated or collaborative interoperability

Klein and Mayer (2011, p.22) state that the question for policymakers and regulators is whether to impose rules on market participants that lead to greater connection among account providers or whether to let matters develop so as not to interfere with incentives to innovate given the rapid technical developments and the difficulty in assessing fully the consequences of regulatory action.

Di Castri (2013, pp. 32-34) also distinguishes between two principal approaches to creating interoperability: the collaborative approach on the one hand, and mandating interoperability on the other. Tanzania has followed the first, while Ghana and Nigeria adopted the second.

In the collaborative approach, the policy maker acts as an intermediary. More precisely:

"The policy maker should act as a facilitator, helping providers to create the road map that they will be primarily responsible for designing and implementing. The policy maker can also assist providers with their evaluation to ensure a) that interoperability is set up at the right time, b) that it creates value for both customers and providers, and c) that regulatory risks are identified and mitigated." (di Castri 2013)

The regulator should only intervene if the market is sufficiently developed, with a functioning agent network and an active customer base (see also Camner, 2012). As an example, before 2013 the Central Bank of Congo refrained from intervening in the market, concentrating instead on customer education and encouraging service uptake.

The different approaches for interoperability (via the platform; via the agents; or via the SIM card, see CGAP 2011) present different types of costs and regulatory risks, which the regulator can help to clarify. The regulator should also take care that interoperability does not stifle emerging competition, for example investments in agent networks if third-party sharing is implemented in an immature market.

In both approaches it is considered necessary that all parties involved see the value of participating (Camner, 2012). In particular, instead of devaluing their investments the introduction of interoperability should be expected to increase the value of their infrastructure through higher usage. This is important even under mandated interoperability, since foot-dragging by unwilling operators can create unnecessary delays and reduce user benefits.

Furthermore, under either approach someone (the central bank or a third party) will have to take on the role of coordinator and intermediator. As Bindo (2015) states:
"There will be an inherent challenge in coordinating teams from different organisations, with potentially different cultures and practices, to work together. This tension will be exacerbated if providers do not share the same level of enthusiasm for the project, especially during the development and piloting phases, when concentrated effort will be required. In such a case, there may be need for a neutral and trusted party to consolidate the interests of the mobile money providers, partner organisations, as well as external influencers, like the regulators and governments, to drive a common agenda."

Within the different regulatory options for interoperability, GSMA (2014) identifies the following operational arrangements:

- Bilateral agreements between mobile money schemes and banks;
- Neutral processor between mobile money schemes and with banks;
- Commercial processor between mobile money schemes and with banks;
- Using a bank and a national ACH [Automated Clearing House] to interface with other banks;
- Direct connectivity to national ACH for all mobile money schemes and banks;
- A mix of commercial processor for bank interface, bilateral between mobile money schemes.

It seems to us that the eventual choice of an operational arrangement is rather independent of the whether interoperability is mandated or voluntary.

The collaborative approach has variations. It could be a simple sign of go-ahead under an enabling regulatory approach, or it could lead to deeper involvement in the actual process of negotiation between operators. In Tanzania, the central bank delegated this role to a third party, in order to not having to take sides with any operator. Klein and Mayer (2011) outline the central bank's role as setting standards for interconnection. This role is difficult because technology moves on, and by the time the agreement is reached a better technology may be available. They conclude that standards would thus need to be technology-neutral as much as possible, focusing only on basic requirements for authentication, communication protocols and verification. An ongoing process of consultation between regulators and private providers is necessary.

Mandating interoperability can have advantages, depending on the circumstances. It increases competition and breaks deadlock due to dominant positions. But as mentioned above, the state of the market should be an essential factor in making this decision. For example, CGAP and BFA (2012, p.25, Box D) concluded that mandating interoperability of retail payments (not mobile money) at an early stage in Ghana is a cautionary tale because it was hard to enforce and had limited effect.

In this respect, di Castri (2013) concludes:

"In terms of increasing competition, it is the regulator's responsibility to ensure that any intervention aimed at breaking a monopoly or abusive dominant position does not harm the industry, create an unequal playing field for current market players, or negatively impact customers. Competition authorities usually weigh the costs and benefits of these interventions carefully. In fact, high market share does not necessarily mean that consumers are paying excessive prices, that competition and product innovation are being stifled, or that the company with high market share is abusing its power (such as through exclusionary practices). The timing and cost-effectiveness of any regulatory intervention must be appraised carefully, and market-led solutions should always be the preferred option."

Mas (2011, p.75) states that governments often attempt to encourage interoperability, either through moral persuasion or by creating national switches, but that mandating interoperability from the outset runs the risk of destroying the incentive and motivation of critical first entrants.

Klein and Mayer (2011) thoroughly discuss the implications of mandating interoperability. We reproduce their discussion here, as it cannot be summed up in fewer words:

"Regulators may set interconnection charges or they may unbundle the provision of platform services from the provision of accounts. Doing so is hard in practice. Setting interconnection charges among competing account providers ("two-way access pricing") is conceptually hard. Theory exists only for relatively simple cases and even if it was clear conceptually, it would be hard to agree on costs and the unavoidable discretion involved in allocating them across different services. In a case like M-Pesa, setting the access price involves cost estimation and allocation judgments across the telecommunications business and the account provider. It thus raises issues of where the domain of the telecom regulator intersects with that of the regulator for

the account provider. If the payment platform is also unbundled, complexity potentially increases still further."

"… Mandated interconnection and associated access price regulation remains a controversial topic worldwide. In the end there needs to be a judgment whether the complexity of a regulated solution for interconnection is worth the risk of undermining progress already achieved and stifling further innovation. So far, only one country, Kenya, has achieved breakthrough progress. It is hard to argue that tough regulatory action is needed to solve the "luxury" problem of perfect mobile interconnection of all account providers. In a market with fast-moving technological solutions, the main check on market power may best come from new disruptive technologies rather than from attempts to limit market power through regulation or anti-trust policies."

"…Firms eyeing the mobile payment market need to have incentives to try out new solutions and to invest in distribution networks. If they can expect that, once successful, they will be forced to share their success with others without being sure that they are adequately compensated for their investment as well as the risks they incurred then they might be unwilling to invest in the first place. Moreover, mobile technology is evolving very fast by any historical standard. More likely than not, a few years from now, new superior competing solutions will be found and compete with the early movers like M-PESA."

These arguments help to explain the preference of di Castri (2013) for a market-based collaborative solution. First, being voluntary, operators will design a solution that creates value for them (and hopefully also for their customers, since this should be in their interest); second, since the operators are closer to the market and can be expected to be more up-to-date on technical developments, leaving the design to them is more likely to accompany market and technological developments.

2. Mobile Money and Interoperability Arrangements by Country

In this section we present the available information on a range of countries with important developments in mobile money and interoperability. For ease of consultation the order of countries is alphabetical. An excellent complement to the following country information is Anderson (2015), which contains a transversal study of 46 developing countries and their regulatory regimes for mobile money and interoperability.

Bangladesh

The first mobile money service was launched in 2006, and uptake was still rather low in 2014. Bangladesh has a bank-based model, but interoperability is permitted. As quoted by Anderson et al. (2015), "Banks may link their mobile financial services with those of other banks for the convenience of the users".

Interconnection can happen through a third-party platform, bKash. This platform allows different mobile network operators to join a single network and use bKash for mobile money transactions (Lehman and Ledgerwood, 2013).

Ghana

The central bank of Ghana mandated interoperability of mobile money back in 2008, through its Branchless Banking Guidelines (Blay 2016, World Bank et al. 2015, McKay 2011). Since mobile money was only seen as one further channel for banks to reach their customers, the model was bank-led, with banks owning the customers and the agents. A many-to-many model was imposed, with a group of banks contracting with the mobile operators and jointly operating the agent network (Muthiora 2015).

The mobile money sector underperformed as compared to other countries. One reason could be cultural: Internal migration seems to involve whole families rather

than individuals, which reduces the need for remittances (comment to Fengler 2012).

The central bank also launched an own payment system called eZwich, and mandated the commercial banks to interconnect with this system and distribute the respective smart cards (CGAP and BFA, 2012, p.25, Box D). Take-up was very low, also because larger banks did not see the business case in making customers use these cards. At the same time the VISA card system took off very quickly, and mobile money offers were successfully introduced in the market. Thus market development quickly overtook the Bank's attempts to make the market work better through mandated interoperability. CGAP and BFA (2012) conclude that mandating interoperability of retail payments (not mobile money) at an early stage in Ghana is a cautionary tale because it was hard to enforce and had limited effect.

In 2015, the Central Bank of Ghana replaced the Branchless Banking Guidelines with the Guidelines for E-Money Issuers, which leave much more freedom for bank- and non-bank-led mobile money models and do not mandate interoperability (Blay 2016). In fact, it was hoped market-led solutions would arise (Muthiora 2015).

NextBillion (2016) reports that the Bank of Ghana has initiated stakeholder consultations in order to create interoperability in the mobile money market. In particular, banking institutions were invited to engage with the new initiative.

India

In 2008, the Reserve Bank of India (RBI) established guidelines for mobile banking transactions (RBI 2008).

The Telecom Regulatory Authority of India (TRAI, 2016) reports that the Government of India, in November, 2009, constituted an Inter-Ministerial Group (IMG) to submit a report and recommendations on the framework for delivery of basic financial services using mobile phones. The framework proposed in the IMG report was

accepted as the basis for delivery of basic financial services using mobile technology by a Committee of Secretaries under the chairmanship of the Cabinet Secretary in April 2010 (Ministry of Electronics and Information Technology 2010). The IMG framework envisaged opening of mobile linked 'no-frills' accounts, which would be operated using mobile phones. These accounts would be held by banks and the money would be stored in the banks and not in the users' mobile phones; the customer would be able to perform five basic transactions - cash deposit, cash withdrawal, balance enquiry, transfer of money from one mobile-linked account to another, and transfer of money to a mobile-linked account from a regular bank account. The IMG framework also envisaged compensation to the key players after taking into account the actual costs incurred by them. In the IMG framework, TRAI was expected to provide the required regulatory framework governing the quality of service, provisioning and pricing of mobile services for delivery of basic financial services.

According to Mas (2011), the National Payments Corporation of India (NPCI) has created a micro-switch enabling mobile transactions between accounts of participating banks. If all the banks (and any licensed nonbank account issuers) join and set the interchange fee low enough, then any retailer could in principle declare itself a cash in/out point for any bank simply by virtue of having an account with one participating bank.

In December 2011, Vodafone introduced its M-Paisa service, but had to team up with a commercial bank for cash-in/cash-out. Instead of appealing primarily to the unbanked half of the population – the core of its success in Kenya – it was the half which already had access to banking services that got the easiest access to M-Paisa (FT 2011, 2012). A perceived advantage of the bank-led approach in India was the customers could earn interest on their money holdings. Even so, take-up remained below expectations.

Between 2010 and 2014 the National Payment Corporation of India (NPCI) created a "National Unified USSD Platform" and linked all GSM networks. By 2016 adherence and the number of USSD transactions remained below expectations, which were high due to 225m Jan-Dhan accounts, 1bn Aadhar (unique identity number) cards, and 1bn mobile connections. Indeed, Evans and Pirchio (2015) refer to India as one of the countries where mobile money has failed to take off.

In 2014, the RBI created the licenses of "Payment banks". These harbor small savings accounts, money transfers, but cannot concede credit. Three such banks, from 2015 on, are telecoms companies and will provide cashless banking services. The "Committee on Medium-term path on financial inclusion", in its final report of December 2015, recommends more mobile banking and G2P (government to person) payments as drivers for financial inclusion.

In February 2016, the government Department of Economic Affairs issued "guidelines for the promotion of payments through cards and digital means". These include measures to make the USSD platform more attractive (the transaction price was considered too high, not all payment mechanisms took part). They also called for measures to increase merchant access and interoperability of merchant payments, and better usage of Aadhar numbers for transactions and KYC register.

The present government is attempting to link several initiatives to advance financial inclusion. Under the "JAM trinity" (Narendramodi.in 2016), the Government has linked citizens' bank account number and mobile number to their Aadhar number, with an aim to better target and transfer financial resources to the poor. The Business Correspondent Agent (BCA) model is to extend banking services to the entire country, without having bank branches everywhere. At the same time, the RBI encourages the opening of bank branches, electronic money transfers to benefit receivers, and aims at having at least one bank account per household.

In 2016, the high drop rate, i.e. incomplete transactions due to insufficient network capacity, of mobile banking services still seemed to be a problem.

In July 2016 the Reserve Bank of India published a Master Circular for mobile banking transactions (RBI 2016) that established the following:

> "9. Inter-operability
>
> 9.1 Banks offering mobile banking service must ensure that customers having mobile phones of any network operator is in a position to avail of the service, i.e. should be network independent. Restriction, if any, for the customers of particular mobile operator(s) are permissible only during the initial stages of offering the service, up to a maximum period of six months subject to review.
>
> 9.2 The long term goal of mobile banking framework in India would be to enable funds transfer from account in one bank to any other account in the same or any other bank on a real time basis irrespective of the mobile network a customer has subscribed to. This would require interoperability between mobile banking service providers and banks and development of a host of message formats. To ensure inter-operability between banks, and between their mobile banking service providers, banks shall adopt the message formats like ISO 8583, with suitable modification to address specific needs."

Thus the goal is interoperability between banks' mobile money schemes which is based on transfers between bank accounts.

Indonesia

Indonesia has 250m people on more than 17,000 Islands and is rapidly urbanizing, so there is a large demand for mobile transfers. Mobile money started in November 2007 with Telkomsel's T-Cash, in March 2008 Dompektu by Indosat came in, then mCoin in February 2012 and XL Tunai June 2012. Until 2013, the central bank did not allow agents; mobile operators had on average 25 cash-out points nationwide. The Regulation on Funds Transfer was issued in March 2013, followed by branchless banking pilot guidelines in May 2013. The latter allows service providers to build

networks of agents who can perform cash-in and cash-out for their customers, as well as open mobile money accounts on their behalf. As a result, several thousand agents opened business.

In May 2013, Telkomsel, Indosat, XL introduced A2A-Interoperability (GSMA 2013b, GSMA 2014, CGAP 2015), which as an agreement negotiated between the operators was a world-first. The choice fell on bilateral connections so that the scheme would not be dominated by any single operator. GSMA (2013 SOTIR, Text box 11) states that joint development was chosen for its simplicity, neutrality, and cost-efficiency, with deployment happening in just 6 months. Two of the operators developed their platforms in-house, and the third one purchased the core platform from an external mobile money software vendor (Camner, 2013a, 2013b).

Furthermore, the scheme was open to new operators joining in. Likely as a direct consequence of this open and interoperable scheme, WOW! Entered in May 2013 and eCash by Bank Mandiri in November 2013. Thus interoperability significantly lowers entry barriers and allows for more customer choice and better deals.

GSMA (2013b) contains more information about the actual management and technical process of creating interoperability, and stresses that the regulator has let the market choose.[2]

Still, growth remained behind expectations, and Evans and Pirchio (2015) list Indonesia as a case where mobile money did not take off.

Kenya

Companies and History

Mobile penetration is high in Kenya. According to figures from the Communications Authority of Kenya, there were 39.7 million subscribers in June 2016, which corresponds to a penetration of 90% of population (note however that the number of unique users is probably lower, because it is common to own more than one SIM card).[3] Four mobile network operators dominate the market: Safaricom (65.2% of subscriptions in June 2016), Airtel (16.6%), Orange (13.2%) and Equitel (5.1%).[4] Interestingly, Equitel is a joint venture between Airtel and the leading bank in Kenya, Equibank, which has been very successful in bringing banking services to the poor. Equitel's service uses "thin SIMs", which are placed on top of a user's existing SIM, to allow using the mobile telephony and mobile money services of different operators.

The four leading mobile operators all provide mobile money services to their consumers, under the brand names M-Pesa (Safaricom), Airtel Money (Airtel), Orange Money (Orange) and Equitel (Equitel). There are also two other mobile providers: Mobikash and Tangaza. In June 2016, the shares of subscriptions for mobile money were as follows: M-Pesa had 65% of the market, Airtel 18%, Orange

[2] eServGlobal (2015) wrongly states that the central bank is leading the way for interoperability.

[3] See: http://www.ca.go.ke/images/downloads/STATISTICS/SECTOR%20STATISTICS%20REPORT%20Q4%202015-2016.pdf.

[4] There are also 2 recent new entrants, Sema Mobile and Mobile Services, but with negligible market shares.

1%, Equitel 7%, Mobikash 7% and Tangaza 2%.[5] The dominance of M-Pesa is even greater measured on the number of transactions (82%) or the value of transactions (84%).[6]

There are a total of 158,727 agents over the country in June 2016, and here again M-Pesa is very dominant, with 107,936 agents, against 13,944 agents for Airtel, the second player in the mobile money market.

The market leader, M-Pesa, was the market pioneer. It was launched in March 2007 by Safaricom, a 40% subsidiary of Vodafone. The service had been preceded by informal use of airtime credits as money – these credits were transferrable between users (KEU 2010, p. 34). M-Pesa took up extremely fast. In 2009, two years after launch, it was reaching already 40% of population. The richer used the service first, then poorer people (KEU, p. 20), but demand remained strongly concentrated in western Kenya and Nairobi, less so in eastern Kenya due a lower use of mobile phones.

Rival mobile money services soon followed suit. Zain introduced its Zap mobile money service in 2009 (Zain operations in Africa were later acquired by Bharti Airtel in 2010). Yu launched Yu-Cash the same year (2009) – it was later acquired by Safaricom for the network and Airtel for the customer base.[7] Finally, Telkom Kenya launched its Orange Money service in 2010 and Mobikash entered the market in 2011. Equibank decided to enter the mobile money market in 2014 to react to the competition from Safaricom M-Pesa in particular.

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[5] See: http://www.ca.go.ke/images/downloads/STATISTICS/SECTOR%20STATISTICS%20REPORT%20Q4%202015-2016.pdf.

[6] Market shares computed by the authors using the data from the telecommunications regulator.

[7] See: http://www.revue-banque.fr/banque-detail-assurance/article/kenya-grandes-manoeuvres-autour-clientele-non-banc

Regulatory measures

The Central Bank of Kenya (CBK) took a light approach when M-Pesa approached it. The CBK decided to issue a "letter of no objection" and let M-Pesa enter the market.[8]

It then let the market for mobile money emerge and develop, while providing oversight. The regulator also decided on limited requirements for mobile money agents, with the idea that they were not providing banking services. On the other hand, the mobile money providers had to report financial and usage data periodically to the regulator.

Interoperability

M-Pesa lacks interoperability with any of the rival mobile money services. Yet, it has been and still is very successful. Due to its success and dominant position, in the last two years Safaricom has been under pressure to change its ways. In July 2014, the Competition Authority of Kenya (CAK) ordered Safaricom to open up its extensive network of agents to its rivals. A few weeks earlier, perhaps in anticipation of this decision, Safaricom had actually decided to open up its network of M-Pesa agents to its rival Airtel, presenting this move as a commercial decision.

Safaricom opened up its M-Pesa agent network so that its main rival Airtel can sign them up to act as its agents too ("agent-level interoperability"). However, in practice, some of Safaricom's agents seemed to have remained exclusive to the firm.[9] Though Kenya's National Payment System Regulations of 2014 require the utilization of "open systems capable of becoming interoperable with other payment systems in the country and internationally", account-to-account interoperability does still not exist. In its decision of July 2014, the competition authority declined to

[8] See: http://www.afi-global.org/sites/default/files/publications/afi_casestudy_mpesa_en.pdf

[9] See: http://www.mediamaxnetwork.co.ke/people-daily/158420/safaricom-wont-let-rivals-share-m-pesa/.

cut the cost of sending mobile money off-net from M-Pesa's network.[10] Currently, the Central Bank of Kenya seems to be pushing for interoperability, but Safaricom is resisting.[11] An article from The Economist summarizes the situation as follows: "the government is a big shareholder in Safaricom, and the company also happens to be the country's biggest taxpayer: last year it fed the government $400m in fees, taxes and dividends. Consequently few officials are keen to take on Mr Collymore [Safaricom's CEO]."[12]

Madagascar

In Madagascar, the three mobile money operators -- Airtel Money, mVola and Orange Money -- are not yet interconnected. Evans and Pirchio (2015) mention Madagascar as a country where mobile money "failed to ignite".

On 13 September 2016 the GSMA announced that a national interoperable mobile money system will be launched (GSMA 2016Mad). While the announcement by GSMA is not clear, and no further information seems to be available on its actual form, it seems that this interoperability arrangement is based on a collaboration between the three mobile money operators, i.e. it is similar in spirit to the arrangement in Tanzania.

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[10] See: http://www.businessdailyafrica.com/Corporate-News/Safaricom-wins-M-Pesa-charges-case/539550-2396726-1314xb9z/index.html

[11] See: http://www.mediamaxnetwork.co.ke/people-daily/158420/safaricom-wont-let-rivals-share-m-pesa/.

[12] The Economist, July 11, 2015, "A new east Africa campaign", http://www.economist.com/news/business/21657378-two-african-business-giants-go-head-head-over-mobile-telecoms-and-payments-new-east-africa.

Mexico

In 2004, the central bank of Mexico (Banxico) created SPEI, *Sistema de Pagos Electrónicos Interbancarios*, a central switch for the commercial banking system. G20 (2010) reported that mandatory interconnection through the switch was imposed.

Money laundering concerns were strong (Perez 2016). Mexican regulators in 2011 implemented progressive "know your customer" requirements governing customers opening accounts and documentation requirements. The rules apply to commercial banks, insurance companies, remittance services and foreign-exchange houses. The rules restrict the size of account balances, the cumulative value of transactions and/or the channels to access funds for "low-information clients"—those without the background information or documentation necessary to open a traditional, unrestricted account. As client information accumulates, the restrictions become less stringent. Under the plan, the number of low-information, low-value, peso-denominated accounts have markedly grown, along with their balances.

In 2011, Banxico adopted the "Maya Declaration" (2011 in Mexico City, followed by more declarations). In the same year, the Bank of National Savings and Financial Services, one of Mexico's development banks, committed to a program seeking to link rural residents to 36 formal financial institutions through technology, including mobile point-of-sale locations and mobile devices.

Perez (2016) states that the government created *Prospera*, a welfare program that provides mobile payments (There is not enough information to determine which market players take part).

Almazan (2015) reports that Banxico established SPEI as the de facto clearing and settlement mechanism for low-value transactions, including mobile money. SPEI must be used to settle payments among mobile payments providers, whether directly or through a connected clearing house.

In June 2016, a National Financial Inclusion Strategy, involving mobile payment networks, was published. Perez (2016) reports that in 2014, less than 40% of Mexican adults had a bank account, and less than 29% of adults in rural areas. Almost all (90%) of transactions are settled in cash, and among the unbanked there is a preference for traditional cash payments. One reason for the low penetration of bank accounts is that banks ask for high fees and minimum balances, and are not interested in the business with the low-income population. Evans and Pirchio (2015) conclude that in Mexico mobile money has failed to take off.

Nigeria

In 2009, Nigeria published the Mobile Money Regulatory Framework for Mobile Payments. This scheme is bank-based, and mobile network operators' role is only to provide a platform for the use of banks. Agents can contract simultaneously with multiple banks (Anderson et al. 2015), thus agent interoperability is also part of the system.

Nigeria mandated interoperability between mobile money operators in 2012, by February 28, 2013, via a National Central Switch (Central Bank of Nigeria 2012):

"In furtherance of the CBN's efforts at ensuring effective and robust mobile payments system, all Mobile Money Operators are hereby directed to fully connect to the National Central Switch (NCS) on or before February 28, 2013, to ensure interoperability and interconnectivity of their schemes."

The Nigeria Inter-Bank Settlement System (NIBSS) handles all switching, clearing, and settlement, but agent networks are still used by mobile money users for depositing and retrieving funds (International Finance Corporation 2012). This imposition was not put into practice afterwards (CGAP 2015). Mandatory interconnection may have been related to other efforts to reduce the use of cash in the national economy, as

with the "Cash-less Lagos" project (UniBul 2013).[13] It may have come as a surprise to the market, as it was not mentioned in Bill and Melinda Gates Foundation (2013Nig).

By 2014 Nigeria had 19 mobile money schemes, but both the numbers of registered and active users were very low (Anderson et al. 2015). Evans and Pirchio (2015) also mention Nigeria as a country where mobile money did not show the explosive growth that would be needed to take off.

Peru

Almazan and Frydrych (2015) and GSMA (2015 SOTIR) report that the association of commercial banks (ASBANC), non-bank financial institutions, 30 newly created e-money issuing entities (Entidades Emisoras de Dinero Electrónico or EEDE) and the Peruvian Association of Banks are creating an interoperable platform for mobile money transactions, nicknamed "Modelo Perú". The platform will be developed by the e-money issuers with the help of Ericsson. They state that at a technical level, the aim is to create an e-money account-hosting environment that would service the accounts of all participating institutions in a central location.

To facilitate the implementation and future administration, these partners have created a new company, Pagos Digitales Peruanos (PDP) S.A. PDP is a new service provider established in July 2015 by Peru's government, financial institutions, telcos, and other stakeholders (CFI 2016). PDP is co-owned by the Association of Banks of Peru (ASBANC) as well as many of its member banks and electronic money issuers. PDP developed the shared infrastructure for the mobile money service. For cash-in and out, PDP will leverage Peru's existing network of banking agents, in addition to building more service points. Merchants and agents will be fully interoperable, and the goal is to reach about 20,000 shared agents.

CFI (2016) further relates that ASBANC expected the platform to go live in the third quarter of 2015. This only happened finally on 16 February 2016, under the brand

[13] Cash-less Lagos at http://www.cbn.gov.ng/cashless/.

name BiM. For mobile users on Movistar, Claro and Entel, BiM functions on smartphones or feature phones. No bank account is needed. It is expected to provide the functionalities of cash-in/out, account balance checks, person-to-person transfers, and mobile airtime top-up. Subscribers can send electronic money to anyone, even if that recipient is not signed up with BiM. In this case the recipient can visit an agent to register for BiM or simply withdraw money without registering. BiM also announced that it will roll out ATM integration, deposits, utilities, and merchant payments.

Philippines

Mobile money services launched more than 5 years ago in the Philippines (Smart Money, G-cash); see also GSMA (2009). There is a large amount of internal migration, between the capital Manila and the islands. Thus demand for remittances and therefore mobile money should be expected to be high. But as Evans and Pirchio (2015) state, the number of mobile money account holders as a percentage of the adult population remains below 15%.

Estopace (2016) relates that in March 2016 Smart Communications and Globe Telecom established interoperability between Smart's digital payment app PayMaya and Global's Gcash mobile money service. They were assisted by both the GSMA and Bangko Sentral ng Pilipinas (or BSP, the central bank). It is expected that the two operators will collaborate in domestic remittances, merchant payments, bulk payments, government-to-person (G2P) and person-to-government (P2G) payments.

Rwanda

The first mobile money scheme was introduced in 2010, and in 2015 there were six different ones. Uptake of mobile money services is very high, with 60% of the adult population having a mobile money account, about half of which are active users (Anderson et al. 2015).

The central bank of Rwanda required all payment providers (banks and MNO schemes) to be interoperable by June 2013, through a national switch. While this goal has not been achieved as of 2015, the government is making fast strides towards finalizing the technical aspects of interoperability (CGAP 2015Rwa). Bankable Frontier Associates (2013) lays out a path to interoperability of mobile money in Rwanda.

Evans and Pirchio (2015) state the regulation is entry-friendly and does not create barriers for mobile network operators or other non-banks to enter the market. Banks are required to hold funds equal to e-money issuance in an account at a commercial bank, however "a legal framework to protect these deposits from the MNO (particularly in the case of bankruptcy) is not yet in place" (Argent, Hanson and Gomez, 2013).

Until 2015, account holders could receive money sent from customers of other operators, in the form of a voucher that had to be cashed out at third-party agents. In October 2015, Bharti Airtel and Tigo Rwanda agreed on a pilot scheme for direct money transfer between Airtel Money and Tigo Cash accounts, without the use of vouchers (Birori 2015).

A very revealing detail is that the director of Airtel Money Africa, Chidi Okpala, stated on the occasion that "We championed interoperability in Tanzania and have now done so in Rwanda, with two more countries to go before year end." That is, know-how and the willingness to interoperate acquired in one country are easily transmittable to other countries and may even lead to a regional strategy of interoperability.

South Africa

We mention South Africa in this section because its market developments make an important point: Mobile money will only take off if there is actual demand for it.

The Financial Times (2008) related that the mobile operator MTN set up a 50-50 joint venture with Standard Bank, called MTN Banking, which launched banking by mobile phone in 2005. This service had four elements: a basic account, funeral insurance, a school fee savings plan (involving a government subsidy), and unsecured loans for informal businesses. Even though these services were carefully planned, uptake was slow.

Vodafone launched M-Pesa in 2010 together with Nedbank, but with little long-term success. Evans and Pirchio (2015) refer that the mobile money market in South Africa did not take off. As Centre for Financial Inclusion (2016) puts it:
"Some point to Vodacom's banking partner, Nedbank, as a detriment. Although Nedbank is one of South Africa's largest banks, it caters mostly to middle and high-income customers, who often already have banking solutions. Beyond missed opportunities surrounding leveraging bank partners, it seems the big takeaway is Vodacom has struggled to find customers in South Africa where levels of financial inclusion are much higher than in the rest of the region."

M-Pesa was discontinued in June 2016 because it had gathered too few clients (only 76,000 active users, according to CFI 2016). The main reason pointed out is the wide availability of banking services (in 2016, more than 70% of adults had a bank account), with high levels of financial inclusion (BBC 2016). As a result there is little value-added in mobile money and the critical mass where network effects would kick off was not reached.

In September 2016, MTN also announced that it would shut down its mobile money operation (Barton 2016). Both mobile money operators did not reach critical mass, and probably not even an interoperability agreement would have provided the necessary kick-start.

As mentioned above, the South African market provides a good example of a lack of perceived customer need for mobile money. Seemingly mobile money operators

actually made an effort to provide increased value-added, but given the widespread availability of bank accounts even this was insufficient to stimulate customer interest.

Sri Lanka

Helped along by guidelines issued in 2011, mobile money services started in 2012, but their penetration remained very low: by 2013, just 1% of mobile phone users were active users of mobile money accounts.

Bindo and Hasnain (2016, text box 2) relate that in Sri Lanka, there is an interesting but uncommon interoperability scenario. In 2013, the largest mobile money service provider in the country, Dialog, opened its eZ Cash mobile money platform to others that wanted to offer mobile money services to their customers. Etisalat and Hutch joined this platform and launched services also called eZ Cash. Customers of all three providers use the same platform and the same agent network, so they can send money to recipients on any of the three schemes. In essence, Dialog provides managed services to the other two providers, and customers can seamlessly transfer money between them.

Tanzania

In 2015, Tanzania had a population of 53.5 million inhabitants, out of which 69% lived in rural areas.[14]

1. Telecommunications market

Tanzania has 2 fixed-line operators (TTCL and Zantel), and 7 mobile network operators.[15] According to statistics from the Tanzania Communications Regulatory Authority (CTRA), in June 2016 the 5 leading mobile network operators (MNOs) in

[14] Source: World Bank.

[15] Fixed lines represent a very small number of lines, compared to mobile lines, though.

terms of subscriptions were Vodacom (31% of subscriptions), Tigo (29%), Airtel (26%), Halotel (7%) and Zantel (4%).[16] With a high number of players, and a relatively low level of concentration, Tanzania's mobile market can be considered as competitive.

2G mobile services are available over 85% of the country, and 3G over 35% of it (GSMA, 2016c). In June 2016, according to TCRA,[17] there were a total 39 million mobile subscriptions, and the GSMA estimates that it corresponds to 25 million unique users, 25% of which having a smartphone (GSMA, 2016c).

2. Mobile money services

Financial inclusion through traditional banking services is low in Tanzania: in 2015, only 8% of the population had a full bank account (Financial Inclusion Insights, 2015).

However, in 2016, 4 MNOs compete to provide mobile money services to consumers – Vodacom, Tigo, Airtel, and Zantel – and a fifth provider recently entered in October 2016 (Halotel of Viettel).

Vodacom, the leading MNO in Tanzania, launched its mobile money service, M-Pesa, in April 2008, one year after a successful launch of the same service in Kenya. The take-up of the service turned out to be much slower in Tanzania than in Kenya, and as a consequence Vodacom decided to modify its offer in 2010, in particular by turning to a flat fee for mobile money transfers. In 2008 too, Zantel introduced a mobile money service, Z-Pesa, which was upgraded in 2012 and renamed Ezy Pesa. Airtel, the third largest MNO, launched its mobile money service, Airtel Money, in

[16] Source: TCRA, Quarterly Communications Statistics Report, April-June 2016 Quarter, https://www.tcra.go.tz/images/documents/telecommunication/CommStatJune16.pdf. The two other operators are TTCL and Smart.

[17] Ibid.

2009,[18] and finally, Tigo introduced its Tigo Pesa in September 2010, focusing on money transfers.

These four mobile money services – Vodacom M-Pesa, Tigo Pesa, Airtel Money and Ezy Pesa – are still available to consumers in 2016. As another sign of the competitiveness of the market, the 4th largest MNO (or 5th largest, according to rankings), Halotel, recently launched its own mobile money service, Halopesa, in October 2016.[19]

In about 8 years, the take-up of mobile money services in Tanzania has been quite successful: in June 2016, according to TCRA, there were 17.3 million mobile money accounts.[20] The MNOs' market shares on mobile money accounts were as follows: Vodacom M-Pesa had 43% of the market, Tigo Pesa 32%, Airtel Money 23%, and finally Zantel Ezy Pesa 2%. The numbers published by the Bank of Tanzania (BoT) are a little bit different.[21] According to the central bank, in June 2016, there were 60.4 million subscribers, out of which 19.5 million were active. One has to bear in mind that, as it is common for mobile telephony, many consumers also own multiple mobile money accounts. Therefore, the number of subscriptions is likely to be higher than the number of actual users.

The services offered on the mobile money platforms of the MNOs are domestic and international money transfers, mobile payments (e.g., airtime top-ups), and mobile banking services (balance inquiries, withdrawals, deposits and credit services).

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[18] A few years earlier, in 2005, Airtel had launched a phone-to-phone airtime credit transfer service, Me2U.

[19] See http://mobilemoneyafrica.com/content.php?id=3097.

[20] TCRA, Quarterly Communications Statistics Report, April-June 2016 Quarter, https://www.tcra.go.tz/images/documents/telecommunication/CommStatJune16.pdf.

[21] See http://www.bot.go.tz/PaymentSystem/MOBILE%20TRANSACTIONS.xlsx.

On the other side of mobile money platforms, the number of agents has also increased dramatically over time. According to the BoT, there were 2,757 agents in Tanzania in 2008, and this number increased to 29,095 agents in 2010, 97,613 in 2012, 203,752 in June 2014, and recently 280,675 in June 2016.[22] Transactions doubled between 2013 and 2015 (GSMA, 2016c).

All these statistics depict Tanzania as a success story for mobile money, and hence, it is interesting to analyze what role public bodies played in this development.

3. Regulatory environment

The regulations enacted in Tanzania have placed the central bank (the Bank of Tanzania, BoT) as the supervisor for payments.[23] The Bank of Tanzania Act (enacted in 1965 and updated in 1995) was amended to give the BoT the power to regulate the national Payments System (2003 amendment to the Act) and non-bank payment service providers (2006 amendment).

A new set of regulations has then been introduced to allow the development of mobile money services. In 2007, the BoT issued guidelines for electronic payment schemes to allow banks and non-banks (e.g., mobile network operators) to offer mobile money services.[24] In 2010, the telecoms regulator (TCRA) and the central bank (BoT) signed a memorandum of understanding (MoU) to coordinate their actions on mobile money transfers, the telecoms regulator focusing on network aspects and the central bank on financial aspects. In 2010, the BoT also started drafting Mobile Payments Regulations.[25] The draft regulations allowed non-banks,

[22] Ibid.

[23] This section is based on di Castri and Gidvani (2014) and other sources cited.

[24] See: http://www.bot.go.tz/PaymentSystem/Docs/e_Schemes%20Guidelines%20June%202007.pdf.

[25] See: Alliance for Financial Inclusion (2011): "Mobile Financial Services: The Bank of Tanzania learns from the Bangko Sentral ng Pilipinas". Available at: http://www.afi-global.org/sites/default/files/afi_knowledgeexchangeinsights_tanzania_8dec2011_lg.pdf?op=Download

such as MNOs to offer mobile money services, after clearance from the central bank through a no-objection letter.[26] These Mobile Payment Services Regulations have been eventually included into the National Payments Systems Act enacted in 2015.[27]

According to di Castri and Gidvani (2014), interoperability (either at the agent, customer or platform level) was a stated requirement in the draft regulations. However, it was not formally mandated and the BoT had indicated its preference for a market-based solution to interoperable. We will describe this process, which turned out to be successful, in the next section.

As a final remark, agent exclusivity is not permitted in Tanzania. This is in particular prohibited in the 2013 Guidelines on agent banking for banking institutions, issued by the BoT (article 11).[28]

4. Process leading to interoperability

The process that led to interoperable wallet-to-wallet transfers between mobile money systems started in 2012.[29]

In a first phase, from November 2012 to August 2013, a team from the International Finance Corporation (IFC) discussed with the various stakeholders – the MNOs and their supporting banks – to create a working group on interoperability.

[26] The no-objection letter specified that mobile money service providers were subject to BoT oversight, and to prudential and non-prudential regulatory requirements for the provision of mobile money services.

[27] See: http://www.bot.go.tz/PaymentSystem/GN-THE%20ELECTRONIC%20MONEY%20REGULATIONS%202015.pdf.

[28] See: http://www.bot.go.tz/BankingSupervision/GUIDELINES%20ON%20AGENT%20BANKING%20FOR%20BANKING%20INSTITUTIONS%202013.pdf.

[29] We provide here a brief summary of IFC (2015), which describes this process in detail.

In September 2013, a working group was formed with the 4 leading MNOs and 2 banks, and it received funding and technical support from the Bill and Melinda Gates Foundation and the Financial Sector Deepening Trust of Tanzania. This group then met on a regular basis to decide on the operational rules for interoperability.

The working group reached a final agreement on rules for wallet-to-wallet transfers (which had been chosen as the top priority) one year later, in September 2014. The rules covered various aspects of interoperability, but not the pricing of off-net mobile money transfers. Indeed, to comply with competition policy and avoid any risk of collusion, it was decided that wholesale prices for wallet-to-wallet transfers would be negotiated bilaterally between the market players, and not collectively.

In September 2014, Airtel and Tigo reached a bilateral agreement (their off-net transfer services were launched commercially in February 2015). In December of the same year, Tigo and Zantel also signed an agreement on interoperability. And finally, one year later, in February 2016, the market leader, Vodacom, signed bilateral agreements with Airtel and Tigo.

The following figure (from Warioba, 2016) shows the evolution of wallet-to-wallet off-net transfers since the fall of 2014.

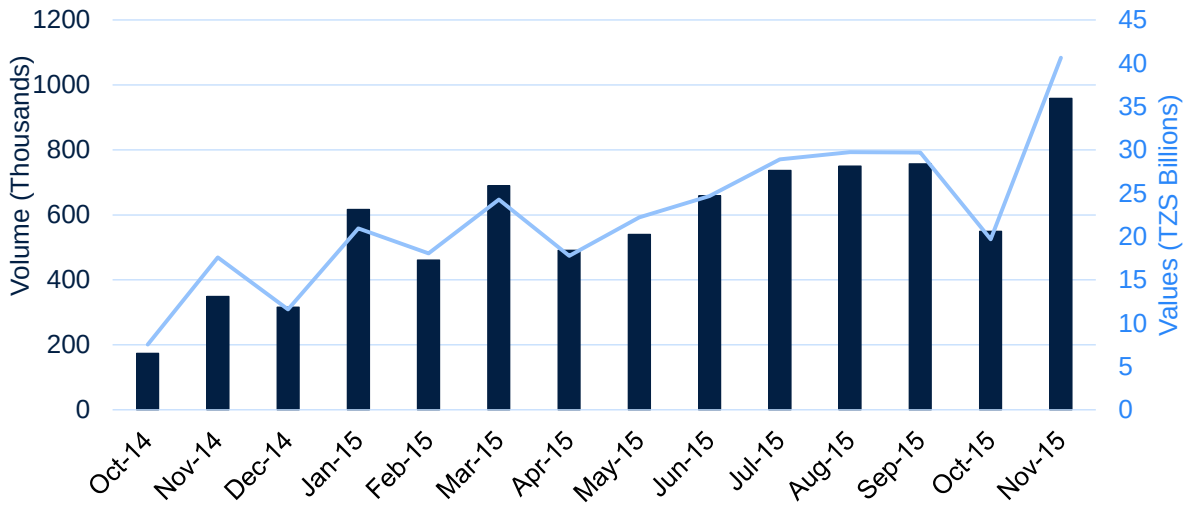

Figure 1: Off-net wallet-to-wallet transfers in Tanzania, Oct. 2014-Nov. 2015

Source: Warioba (2016), from data the BoT

In November 2015, there were 958,512 off-net transfers, to be compared with a total volume of mobile payments of 120,895,506.[30] So, the share of off-net transfers was less than 1% in this month.

5. Impact of interoperability

The numbers from the previous section suggest that since they reached agreements on interoperability, the mobile money service providers have been relatively slow in promoting off-net transfers.

Today, in terms of value or volume, off-net wallet-to-wallet transfers are estimated to be around 6-8% of total transfers (GSMA, 2016c), but they are growing.

The slow pace at which interoperable transfers have developed can be explained by the fact that consumers had developed different bypass strategies to circumvent the lack of interoperable transfers.

First, as already explained, many consumers own multiple mobile money accounts from different providers, and this is particularly true for the high-usage consumers. Second, some consumers used vouchers to send mobile money off-net. A consumer would send a voucher via SMS to a recipient, who would then cash-out the funds, before possibly cashing-in them into his or her own mobile money system. According to GSMA (2016c), interoperable transfers have now surpassed vouchers for Airtel and Tigo.

[30] According to BoT (http://www.bot.go.tz/PaymentSystem/MOBILE%20TRANSACTIONS.xlsx).

The following figure (from GSMA, 2016c) shows the evolution of interoperable transactions on Tigo's network from August 2014 to July 2016.

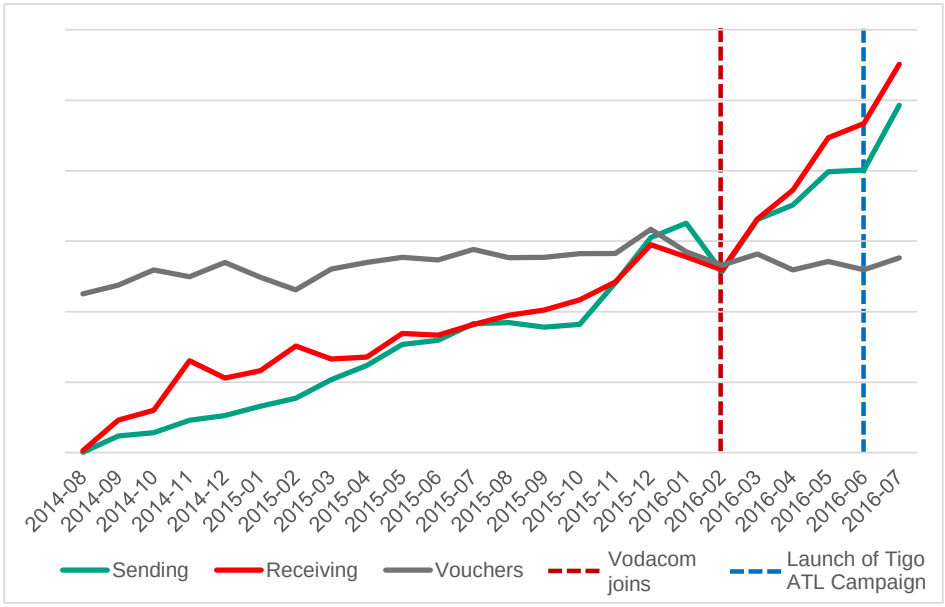

Figure 2: Number of interoperable transactions on Tigo's network, Aug. 2014-Jul. 2016

Source: GSMA (2016c).

The figure shows that the number of sending or receiving transactions surpassed the number of vouchers at the beginning of 2016, and that the number of vouchers has decreased since then.

Furthermore, the bilateral agreement reached by Tigo with Vodacom has stimulated off-net transfers on Tigo's network. Their advertising campaign, promoting off-net transfers ("ATL campaign"), has also had a similar positive effect.

5. Lessons from Tanzania

From our point of view, the following conclusions or lessons can be drawn from Tanzania.

First, Tanzania has a very dynamic mobile market, which has been certainly conducive to the development of mobile money. In Tanzania, 7 MNOs are competing, and the first three MNOs are almost on an equal footing, with 25-30% of the market each. We can therefore interpret the introduction of mobile money services as a way for MNOs to differentiate from their rivals and to generate additional revenue streams. For instance, after Vodacom's entry into mobile money, we observe that its main rivals quickly followed suit. Recently, a fifth MNO, Halotel, also launched its mobile money service.

Tanzania's success in mobile money might therefore not be easily replicated in less competitive mobile markets.

Second, mobile money services had already taken up when the talks about system interoperability started. In 2012, according to the BoT there were 26.9m mobile money subscribers, with about 8m of them active, and about 100,000 agents. Vodacom M-Pesa was the leading provider, but with not much more than 50% of the market.[31]

Mobile money service providers were therefore in a situation where they had incentives both to satisfy their existing customers by introducing new services (e.g., off-net transfers) and to recruit new customers. IFC (2015) indicates that there was a demand for interoperable transfers expressed by existing mobile money users. As further evidence, Tigo (which was number 2 in the mobile money market) was said to be willing to interoperate with the rival mobile money networks.

Third, the authorities in Tanzania, and in particular the central bank (BoT), adopted a cautious approach to achieve interoperability, the so-called "test and learn" approach or "market-led" approach. The authorities did not mandate interoperability, but rather let the market players (the MNOs and the banks) reach a

[31] InterMedia (2013) gives the following estimates of the players' market shares in April-May 2012, based on consumer survey: Vodacom M-Pesa 53%, Tigo Pesa 18% and Airtel Money 13%.

consensus. It seems to us to be an important success factor. Interoperability should be reached via consensus. Each market player should find in its best interest to interoperate. Otherwise, there are risks that these players, if forced to interoperate, adopt various price and non-price strategies to make interoperability ineffective in practice.

Thailand

In 2015, Thailand had 5.5 million e-wallet users, out of more than 100m mobile customers. Of the former, 4 million use AIS's mPay service, and the rest use True Move's True Money service. DTAC planned to roll out its e-wallet service, called Jaew Wallet, in December 2015.

It is not by chance that this new entry in the mobile money market coincides with the start of interoperability as of 1 December 2015 (Bangkok Post 2015). MasterCard provides security and authentication systems including interoperability networks under this collaboration, while Thanachart Bank provides the settlement system.

The case of Thailand seems to indicate that the creation of interoperability through a party that is independent of the mobile money operators significantly facilitates entry into the market.

3. A Portrait of Mobile Money and Interoperability in Mozambique

In this section we collect the available information about the structure and institutions in the Mozambican mobile money market.

Access to formal financial services is low in Mozambique: According to the Finscope Consumer Survey of 2014, only 24% of adults in urban areas have access to formal financial services, and even fewer in rural areas (Finscope 2014). Batista and Vicente (2013) conducted a field experiment in Mozambique and concluded that in rural regions there is a clear potential for the introduction of mobile money. On the other hand, the most typical access of mobile money in these regions is immediate cash-out at an agent, either because only cash tends to be accepted in shops, or because mobile wallets are not seen as a means to store money.

Mobile money was launched in Mozambique in late 2011, when the mobile operator mcel introduced its mobile money service Carteira Móvel (branded mKesh). Vodacom introduced M-Pesa in May 2013. By October 2014, these two networks together had about 500,000 clients (GIZ 2015). According to information provided by mKesh in March 2016, their network had above 2m active users, while m-Pesa had about 1m active users. On the other hand, according to Pitta (2016), in March 2016 out of 3,135,000 registered mKesh users (of which 475,000 with PIN) only 60,000 were active (at least one transaction per month). In other words, these numbers are very unreliable or depend strongly on what is meant by “active users”.

According to information provided by market players, while mKesh has more clients, these do not keep e-wallets but rather tend to cash out money balances. At M-Pesa, on the other hand, clients are actively encouraged to maintain e-wallets. Thus the two mobile money operators’ business models seem to differ. The M-Pesa agent network is also significantly more developed than mKesh (more than 12,000 agents for M-Pesa, and about 4,000 for mKesh according to Pitta, 2016).

At present, mobile operators see mobile money as a way to capture more clients and are therefore not very interested in interoperability even if in the medium run it would be better for all operators (INCM). In other words, the mobile money operators have not yet reached a mature state of development where interoperability becomes a growth factor rather than a distraction.

The third mobile operator, Movitel, entered in 2010, concentrating on rural areas, and intends to launch a mobile money service in early 2017. This mobile money service will be provided by its subsidiary m-mola under the brand name e-mola.

Interbancos / Ponto24 was a banking and ATM/POS network of banks that was founded before 2004 and until recently comprised 11 banks (BCI, FNB Moçambique, Moza Banco, Banco Único, BTM, Standard Bank, CPC, Capital Bank, Banco Oportunidade, Socremo e Tchuma, but not Millennium BIM which still has a separate network). The Interbancos network offers ATM and POS access via Ponto24 and VISA cards, internet (NET.24) and mobile (MOBILE.24) banking services.[32]

According to BFA (2012), some large banks had developed their own payment networks and had little interest to spend time and money on participating in Interbancos. Therefore the Bank of Mozambique founded SIMO (Sociedade Interbancária de Moçambique) in 2011, with the aim to provide a national switch for the formal banking system. Banks invested and joined from 2012, but development was slow. There was no unanimity concerning the benefits of SIMO, as some banks saw their own payment infrastructure as a competitive differentiator and investment in SIMO as disturbing their own investment plans (BFA 2012).

A solution to this issue was found in mid-2015 when SIMO contracted with Interbancos to provide the infrastructure and services for the national switch. At the end of 2016, the network does not yet have the capability to clear mobile money

[32] Company information at https://www.ponto24.co.mz .

transactions, nor the capacity to handle the additional traffic that would result from Millennium BIM (which has the largest proprietary ATM network) joining in. Additional investment will occur, with financing from the German KfW, but the timeframe for SIMO's completion is unclear.

Both MKesh and M-Pesa have a link with Interbancos since 2012, which allows their customers to withdraw money at ATMs without having a banking card. In 2014, mcel and Mozabanco entered a partnership to interconnect their banking and mobile money services (Jornal de Negócios, 2014), but has not yet been launched by the end of 2016 (interview with mKesh). A similar agreement between M-Pesa and Standard Bank for two-way transfers between bank and mobile accounts was closed in August 2016, and M-Pesa is looking for further agreements with other banks.

Furthermore, commercial banks have launched their own platform of "banking wallets" (confusingly also called "Carteira Móvel"). These have some features similar to mobile wallets, i.e. money transfers to other clients at the same bank or at other banks in the Carteira Móvel network, or to mobile phone numbers not yet associated with the network, withdrawals at ATMs, and do not give access to banking cards. These banking wallets are loaded via transfers from bank accounts and from other users. While they can be accessed via mobile networks, clients cannot use the mobile operators' agent networks for operations.

Anderson et al (2015) state that no interoperability regulation exists. At present there is no interoperability between mobile money providers, but partial interoperability between the latter and commercial banks is emerging. It can be expected that more bilateral agreements of this type will be made in the near future, as long as both sides see the mutual benefits.

Agent networks are no longer exclusive, in the sense that each agent can represent multiple mobile money operators via separate float accounts. According to mKesh, it

opened its agent network, giving up on exclusivity, in order to follow market demands, while the Central Bank states it has imposed the end of exclusivity.

Recently, the Bank of Mozambique relaxed KYC regulations to make opening accounts easier, for restricted types of service. Clients can now register with a single form at their mobile operator and the corresponding mobile money network, which makes registration much simpler (INCM).

In July 2016, Mozambique launched its Financial Inclusion Strategy, with the aim to increase access to financial services from 24% to 60% of the population by 2022. (World Bank 2016). On the other hand, international mobile money transfers are not yet possible. FSDMoç expects that international remittances could significantly increase the liquidity of the mobile money system.

4. Findings from the Stakeholder Meetings

From 28 November to 2 December 2016, Steffen Hoernig visited Maputo and met with representatives of the following institutions and companies:

- Regulators: Bank of Mozambique, INCM
- National switch: SIMO
- Mobile money operators: MKesh, Movitel, M-Pesa
- Commercial banks: BCI, FNB, Millennium BIM and AMB (including representatives from Barclays and Standard Bank)

Here we present the main findings and opinions voiced at these meetings, organized by topics.

4.1 Financial inclusion and reach of mobile money

A common theme of the various meetings was that a large increase in financial inclusion would require a strong effort in financial education, in order to convince in particular the rural population to accept mobile money and to keep it circulating in electronic form, instead of seeking an immediate cash-out.

Naturally the issue is one of culture: The traditional economy is highly cash-based. It is also highly circular: If all sellers of goods and services and their intermediaries only accept cash, then no buyer will see any use for holding mobile money in a mobile wallet. In order to break this circularity, the following is needed:

- Numerical literacy (as a precondition for digital literacy) and financial education, passing through school education and mobile money operators;
- Uniform usage of terms and expressions for the different kinds of services on offer, in order to reduce consumer confusion and increase trust;
- Development of usage cases apart from simple cash-out, so that holding mobile money brings real benefits;

- Attempts to break the cash payment cycle by having retail intermediaries from larger towns and state institutions accept mobile money apart from cash.

The reasons why it is so important to make money receivers keep the money in electronic form is two-fold: First, the reach of mobile money under cash-out is not primarily limited by the range of mobile telephony networks, but rather by the reach of their agent networks. Agent networks themselves are limited by agents' distance to the next bank branch, because agents need to provide the liquidity that is necessary to serve cash-out requests. This is particularly relevant in rural areas, where more money tends to be cashed out than cashed in, either through transfers or salary payments.

Second, more payments in mobile form reduce the need for cash-out agents and deepen the reach of mobile money towards the maximum given by the coverage of mobile networks.

Interoperability can help with this, in particular that between commercial banks and mobile money operators, as it strengthens both the credibility and the liquidity of the mobile money system. On the other hand, interoperability between mobile money schemes, while benefitting existing customers, would not have such a far-reaching effect.

4.2 The various modes of interoperability

As discussed earlier in this report, there are various different modes of interoperability: Between mobile money operators (M2M), between the latter and banks (B2M), between banks, plus a few variants such as between banking wallets and other banks or mobile money operators.

The modes that are most relevant for this report are M2M and B2M interoperability. Opinions were relatively uniform, though not completely so.

As concerns M2M interoperability, which we have seen from previous country studies makes most headlines, stakeholders generally agree that it will have to happen at some point in the future, but that it is not an immediate concern. Mobile money operators perceive it as a future step in the development of their business models, but do not consider the market ripe enough so that it would be mutually beneficial to operators. On the contrary, all operators see their mobile money offerings and investments in their agent networks as means to capture clients and grow their networks. Interoperability between mobile money schemes would dull these competitive intentions, even more so if it were to be imposed.

Interoperability between banks and mobile money operators is considered of high importance by mobile money operators and most banks. As referred to earlier in this report, a few bilateral agreements for two-way transfers between bank accounts and mobile wallets have already been made. The perspective of the market is that more voluntary agreements will happen in the near future, with (almost) all commercial banks joining in. All mobile money operators, and one commercial bank, indicated that they would be open to interoperability with multiple other banks, or mobile money operators, respectively. Still, there were also some more cautious voices questioning commercial banks' benefits from interoperability, fearing the loss of customers.

A related issue was the interoperability between banking wallets and mobile wallets on the one hand, and access of bank clients to mobile operators' agent networks (for cash-out) on the other. These seem to be issues of commercial strategy that should be left open to negotiations between potential partners.

4.3 SIMO – the national switch

Stakeholders agree that a national switch with a unique interconnection link for each bank and mobile money operator is much simpler and more efficient to administer than bilateral agreements, and therefore agree to a future role of SIMO as envisaged

by the Bank of Mozambique as a unique interconnection point. One mobile money operator voiced concerns about the effects on liquidity if real funds must be transferred to a central hub; the same operator welcomed the possibility to interconnect with the smaller banks via SIMO, but would like to maintain individual links with the larger banks.

Still, strong concerns were voiced about its readiness in the near future to support interoperability. First, as stressed by SIMO itself, further investments in infrastructure will be necessary to increase the capacity of SIMO to a level where it can bear the extra load created by the participation of all commercial banks. This applies in particular to Millennium BIM, whose entry to the system will increase the number of ATMs by 40%. These investments are being planned and will be financed by the German KfW (and possibly other sources). The completion date remains unclear.

A second concern is technical and regulatory uncertainty. Stakeholders underlined the necessity for clear technical specifications and administrative rules, in order to better prepare for the full launch.

A third concern, voiced by some stakeholders, was that “on-us” transactions (those within the same bank or mobile money operator) should not have to pass through SIMO. Passing these transactions through SIMO would add an additional level of complexity and a potential transaction bottleneck that can be avoided.

The main message that we retain from the meetings with stakeholders is that transparency and certainty about the design and roll-out schedule for the final version of SIMO is essential. Banks and mobile money operators need this certainty to decide on their investment schedules, while uncertainty holds back investment.

As concerns a potential imposition of various modes of interoperability, this should only be considered once SIMO has the capacity to host all banks and mobile money operators.

4.4 The role of Bank of Mozambique

Stakeholders agreed that interoperability between mobile money operators themselves, and between banks and the latter, will eventually have to happen. Still, no stakeholder was in favor of an imposition of interoperability, particularly at the present stage of market development:

- Interoperability between mobile money operators reduces the intensity of competition to capture clients and invites free-riding on others' investment;
- More stringent regulation such as an imposition of interoperability tends to be followed by even more stringent regulation such as transaction price lists, in order to control further the actions of the various participants. This stifles innovation and dulls incentives to differentiate;
- Interoperability between banks and mobile money operators is starting to be implemented through bilateral agreements, and it is expected that more agreements of this kind will happen in the near future;
- Mandating interoperability would cause further delays rather than advance the process;
- SIMO is not considered ready yet to support universal interoperability.

There was general agreement that the Bank of Mozambique could play a decisive role by creating certainty and clear rules, and by providing incentives to participate in interoperability. This concerns in particular the design and readiness of SIMO to host all transactions, and the rules for the pricing of transactions between operators.

As an example for the latter, a proposal by one operator was that commissions for off-us transactions, i.e. between different mobile money operators, could be allowed to be charged at a higher rate, in order to increase incentives to invest in agent networks.

An important part of this role would be to listen to the various stakeholders and their concerns, and try to find a common denominator that can be built on. One mobile money operator also indicated that they would like to see Bank of Mozambique take a more active role than just being a mediator. Being able to mobilize public and private financial resources, the Bank could help build a common platform for all operators. This platform would also be more easily supervised and could create standardized financial reports.

In conclusion, stakeholders would like to see the Bank of Mozambique as a mediator and a provider of transparency and clear rules, so that banks and mobile money operators can design their business plans and investment strategies under the necessary certainty about interoperability on a common platform.

5. Discussion and Recommendations

In what follows, we first discuss the high-level options for interoperability. Then, we discuss the trade-offs between mandating interoperability and leaving the decision to the market, and how the level of market maturity and the presence of a dominant firm can affect this trade-off. Finally, we draw lessons for Mozambique and provide some recommendations.

5.1 High-level interoperability options

Three main variants of interoperability have been considered in countries where mobile money has developed:

1. Voluntary interoperability using bilateral agreements.
2. Voluntary interoperability using a national switch.
3. Mandated interoperability using a national switch.

Option 1 has been implemented in Indonesia, Tanzania and Rwanda. Option 2 is the route followed in Pakistan and Peru. Finally, option 3 has been adopted in Ghana, Nigeria and in Mexico.

Bindo and Hasnain (2016) propose an evaluation of these high-level options. They argue that banks, payments systems and mobile network operators are all capable of implementing interoperability. Therefore, all options are a priori possible and the path to follow may depend on the technical readiness of the existing financial ecosystem.

For example, Mexico's national switch for inter-bank transactions was created in 2004 and was well established when mobile money operators entered the market. Therefore, it seemed natural and cost efficient that they interconnect through the same system.

In Pakistan, mobile money operators are bank-led, and these banks were already used to interconnect through a third-party switch. This solution was then adopted due to ease of implementation, though it meant giving up some control and having to obey to the rules set by a third party.

On the other hand, in Tanzania the starting point was that mobile money operators were interconnected with retail banks. In this case the least costly solution was found to be a network of bilateral links (Bindo and Hasnain, 2016). Operators also found it important to maintain control over the system and the accompanying costs. A final motivation to choose the option of bilateral agreements was to avoid any collusive concerns (see the chapter on Tanzania).

GSMA (2015 SOTIR) states that industry collaboration is critical for domestic interoperability, as well as the launch of new products with other mobile money providers. Furthermore, GSMA writes that "Commercial solutions also matter. First of all, transaction fees should remain as low as possible, similar to on-net fees, in order to incentivize uptake. Second, if operators pay to each other for money entering their system, as in Rwanda and Tanzania, this creates incentives to keep mobile money in the system, increasing liquidity. Most other interoperability agreements relied on the inter-bank model or had no compensation at all."

5.2 Voluntary or mandated interoperability

A regulatory intervention to mandate interoperability may have benefits – each individual mobile money system becomes part of a wider, interoperable network. But mandated interoperability has also costs, and these costs should be balanced against the potential benefits.

Firstly, mandated interoperability could hamper market development, by reducing the incentives of market players to compete and innovate with market leading solutions, as they have to share their network with their rivals. This concern was clearly expressed by all three Mozambican mobile money operators in the stakeholder meetings. Furthermore, this risk can be particularly high in early stages

of market development, when consumer demand and the appropriate business model are still uncertain, and the agent network is not yet fully developed.

Secondly, the interoperability solution imposed by the regulator may not be the most cost-effective. An overly costly interoperability solution may end up being under-utilized (on this argument, see e.g. Clark and Camner 2014).

At the extreme, mandated interoperability could have the undesirable effect of leading some operators to leave the market.

The question for public authorities, rather than whether to mandate interoperability, is how and when they should intervene to secure interoperability, having in mind the costs and benefits of their intervention.

Regulators are not restricted to a zero-one decision between laissez-faire and interventionism. A continuum of approaches exists within these two extreme policies. The regulator can let the market players reach an interoperable solution of their own, but take action to ensure that interoperability is feasible and at reasonable cost. Such action can also make ex-post regulatory intervention credible, in case it becomes necessary at some point given the market developments.

In countries where interoperability has been market-led (e.g., Tanzania or Pakistan), public agencies – and in particular, the central banks – have also played a coordinating role. They did not dictate how interoperability was to be implemented, but rather let the industry players find a solution that suited them all. The central banks made sure, however, that the solutions adopted by the market players were coherent with financial regulations (in terms of stability, risk management, etc.).[33]

In Tanzania the Central Bank also involved the IFC as an independent mediator, which allowed the Central Bank to not having to take sides in the negotiation (Bindo and Hasnain 2016).

[33] See Bindo and Hasnain (2016), and di Castri and Kaschula (forthcoming).

CGD (2015) argues that when a regulatory intervention is warranted, the timing of this action is key. Too early an intervention may dampen the market development, as we already stated. On the other hand, imposing interoperability too late runs the risk of letting some dominant player monopolize the market.

5.3 Market maturity

The discussion above suggests that the appropriate interoperability solution depends on the stage of market development. Chopra (2014) argues that mandated interoperability in an immature market risks stifling its growth, since in the short run interoperability means lower returns to investment in roll-out and the agent network. In particular, pioneering operators might be deterred from trying to get a first-mover advantage by rolling out their networks quickly.

Investments in the agent network and new services are instruments to differentiate a firm from its competitors and drive the competitive dynamics of the market. In particular in the early stages of market development these investments are essential for reaching a critical mass of users and drive competitive network effects. If this critical mass is not reached the market can collapse, as the case of South Africa shows, and the possibility of market-wide network effects due to interoperability will never be able to arise. Regulatory intervention needs to take care not to weaken these investment incentives.

Once the initial growth threshold is surpassed and competitive network effects have become strong enough, interoperability could follow. Ideally, market participants would agree that further growth for market-wide network effects makes interoperability necessary.

In other words, mandatory interoperability is a regulatory option only in later stages of the market development, but not in initial stages when commercial agreements are also feasible, and possibly only if dominant positions are present in the market.

GSMA (SOTIR 2015) concludes: “Interoperability remains in its early stages and, therefore, the long-term positive benefits of interoperability are yet to be seen. The market that has seen the greatest benefit from A2A interoperability among mobile money providers is Tanzania, proving that market maturity and strong partners are key to reaping the benefits of interoperability.”

5.4 Dominant operators

The case for mandating interoperability may depend on the market structure of the mobile money market (see Bourreau and Valletti 2015). If the market players have relatively symmetric positions, one can expect that interoperability can emerge as a market solution, because the players will see the benefits in the interconnection of their networks. On the contrary, if an operator has achieved a large market share, this operator may see little benefit in interconnecting with its smaller rivals, and it may therefore resist interoperability.

Two lessons can be drawn from this discussion. First, regulation should ensure that no firm, and in particular, no dominant firm, takes actions that increase the costs of interoperability. Second, the design of the appropriate regulatory intervention, based on the trade-offs we have discussed above, depends on whether the mobile money market is symmetric or asymmetric. In an asymmetric market, the regulator may have to take a more pro-active role to ensure that interoperability can be achieved.

Still, free-riding should not be encouraged. That is, lack of investment by smaller operators in increasing their network should not lead the regulator to automatically mandate interoperability. Rather, the regulator should make clear that a reasonable level of investment is to be expected of all market participants as a precondition for regulatory intervention.

5.5 Lessons for Mozambique

From the available information we conclude that the mobile money market in Mozambique has not yet reached maturity. The number of active mobile money clients only seems to be slightly above 10% of the total population, or less than 20% of the adult population.

As a first step, the low penetration of mobile money accounts may call for a closer investigation of the actual needs of the population in terms of mobile money services. As we have seen, remittances were the main driver in Kenya, while a high number of formal bank accounts was the main obstacle in South Africa. The formal banking sector does not reach much beyond urban areas in Mozambique, so the low uptake of mobile money may be due to lack of convincing usage cases in rural areas. Identifying and directly addressing these would help to establish the true potential for mobile money in Mozambique.

As the recent (late 2016) interventions of the Bank of Mozambique in the banking sector show, establishing and maintaining trust in the financial system is of utmost importance. Mobile money is no exception, and if potential mobile money customers believe that their e-wallets are not safe they will not want to have one. The Bank of Mozambique has the central role of creating this trust in the mobile money system, including the necessary provisions in case an interoperability agreement is reached. The regulator should help to set clear rules and common standards. These could build on the GSMA Code of Conduct for Mobile Money providers (GSMA CC 2014).

As a second step, the development stage of the market calls for regulatory policies that maximize mobile money operators' incentives to invest in coverage and wider agent networks. Operators need to compete in these investments to strengthen competitive network effects, before any regulatory intervention is justified. Otherwise there is a large risk that further investment is stifled and even market-wide network effects created through interoperability are not strong enough to let subscriber numbers grow fast. As Evans and Pirchio (2015) stress, markets with

network effects such as mobile money markets either take off strongly – or they don't take off at all: there is no mid-way outcome.

Policies such as simplified KYC (know-your-customer) rules, which have already been adopted in Mozambique, are an important step in this direction, as could be allowing mobile wallets to earn interest: Since inflation is very high at present (at an annual rate of close to 25%), money held in mobile wallets devalues quickly if it does not earn correspondingly high rates of interest. High inflation is another reason for immediate cash-outs of funds and a lack of liquidity in the system that threatens the viability of the agents and the business model.

Even more important from the point of view of mobile money operators is the issue of regulatory (un)certainty. The Bank of Mozambique should set out a clear path for its future actions and commit to it, since uncertainty about how it will intervene in the market may make firms hold back on investments.

As for interoperability itself, creating the legal conditions for mobile money operators to interconnect and encouraging them to do so certainly makes sense. In this case, care should be taken that the available interconnection arrangements are cost-effective and find approval by the market players. From the information that we have gathered, SIMO is accepted as the future central switch for Mozambique, but all market players agree that it is not yet ready and that further investments in capacity and hardware are necessary. Setting out a clear time frame for SIMO's completion would be very helpful to guide expectations.

Stakeholders also pointed out that interoperability between mobile money operators and banks is already being created, via bilateral agreements. As mentioned above, this not only makes mobile money services more attractive to potential users, it also increases the liquidity of the system and the viability of agents. In late 2016 two such agreements existed, while all mobile money operators and most banks were interested in having more interoperability agreements. Thus there seems to be no need for intervention concerning interoperability between banks and mobile money operators while further agreements are being prepared.

On the other hand, mandating interoperability between mobile money operators at this stage will only create weak market-wide network effects since the overall penetration of mobile money is still low. At the same time it risks to stifle investment incentives because it reduces the need to invest in wider coverage and could stunt potential market growth.

As concerns agent interoperability, given the difference in development of the agent networks that was reported to us, an imposition of agent sharing may invite free-riding and discourage further investment. A market-led agreement, on the other hand, with benefits felt by all operators, would be welcome.

A "stick-and-carrot" approach may be adequate. The Bank of Mozambique could encourage mobile money operators to negotiate interoperability agreements, with a promise to not intervene further until the levels of investment in agent networks and services are more comparable. At the same time, the Bank (possibly with the help of the INCM and the Competition Regulatory Authority) could make sure that the larger operator does not create unnecessary obstacles to the development of other mobile money operators (if this case were to arise).

Summing up, we have the following recommendations:

- **The Bank of Mozambique should identify the demand-side factors that lead to low mobile money up-take and address these before intervening in the market.**
- **The Bank should help to define clear rules and commit to a path of action, to create trust, regulatory certainty, and a firm basis for operators' business plans.**
- **The Bank should support the speedy completion of SIMO.**
- **The Bank should play an active role in encouraging agreements between mobile money operators, in particular as long as the market is immature.**
- **Mandating interoperability at this stage is risky, because it risks undermining competition for growth and the necessary investments.**
- **A mix of encouragement of more symmetric investment and possibility of further action if interoperability does not appear in a more mature market might provide the right incentives to all market participants.**

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