



**GPI**

Global Partnership  
for Financial Inclusion

# **Innovative Digital Payment Mechanisms**

## **Supporting Financial Inclusion**

### **Stocktaking Report**

A report by the World Bank Group's Payment System Development Group, the Better Than Cash Alliance, and the Alliance for Financial Inclusion for the G20 Global Partnership for Financial Inclusion

**GPI Markets and Payment Systems Sub-Group  
Deliverable A**

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Prepared for the G20 Turkish Presidency

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## Executive Summary

*Financial inclusion has been broadly recognized as critical in reducing poverty and achieving inclusive economic growth. Financial inclusion is not an end in itself, but a means to an end [...]. Greater access to financial services for both individuals and firms may help reduce income inequality and accelerate economic growth.*

(Demirguc-Kunt et al., 2015)

As communities and economies around the world move into the digital era, evidence is quickly mounting about the power of digital payments to increase financial inclusion, thereby reducing poverty and driving economic growth. Recognizing this potential, the G20's Financial Inclusion Action Plan considers using digital payments and mobile technology as a key component to drive real improvements in access to the financial services that people need to participate fully in economic life. Not least for that reason, the GPFI, which helps to implement the G20's Financial Inclusion Action Plan (FIAP), established a sub-group on Markets and Payment Systems in 2014 to advance the use of payments, including remittances.

In order to implement the FIAP effectively, it is crucial that resources are deployed as efficiently as possible. This means supporting innovations, but it also means making the greatest possible use of existing technologies that have already demonstrated their capacity to boost financial inclusion. The fact is, with 2 billion people worldwide still without access to transaction accounts with formal service providers, it is not always necessary to reinvent the wheel, especially when so many powerful innovations are already proving their utility.

Harnessing existing innovations requires the GPFI to have knowledge sharing at the core of its agenda. To this end, this report presents an overview of those areas in the payments value chain, where recent innovations in digital payments open up new opportunities, particularly in developing economies where the need for financial inclusion is greatest. The key findings include:

- **The capacity of digital payments to boost financial inclusion can be enhanced by key innovations to the infrastructure that digital payments rely on.** The report highlights cutting-edge innovations to infrastructure for communications, finance, identification and electricity-supply. For example new technologies can limit the implications of power outages on access devices, like ATMs or offer the possibility for financial service providers to leverage national ID-infrastructure.
- **Innovations to the design of products and services are putting digital payments within reach of more people, and driving financial inclusion in underserved communities.** For example, advances in biometric and interactive voice technology mean that low levels of literacy need no longer be a barrier to using digital payments. The ability of payment instruments to work across different technology platforms (an essential component of interoperable payment systems), with appropriate customer education, are also areas where targeted design innovations can be a powerful driver of financial inclusion.
- **Improving access to digital payments through innovations in delivery channels has the capacity to underpin greater usage.** For example, technologies such as mobile point of sale devices that can be plugged into a smartphone are allowing sole-trading local market merchants to join the digital payments ecosystem.

Experience-to-date suggests there are three common attributes of an innovation that most influence its capacity to deliver large-scale digital financial inclusion: whether it is based on a sustainable business model, whether the technology can be scaled, and whether it can be adaptable in various markets or segments within a market.

Categorizing and assessing innovations based on the analytical framework suggested in the report offers the GPI the opportunity to monitor developments and promising innovations in the digital payments market in a structured manner. Moreover, through this analytical framework, and by describing select promising payment innovations of recent times, this report aims to provide a practical tool for policymakers across all sectors as they seek new ways to bring the benefits of digital payments to all stakeholders and to increase access to and usage of transaction accounts and payment services – resulting in increased financial access and broader financial inclusion.

## 1. Introduction & Purpose of this Report

### 1.1. Why is Financial Inclusion Important?

As global leaders and policy-makers seek reliable sources of strong, balanced and sustainable growth, along with meaningful reductions in inequality and poverty, increasing financial inclusion has become more important than ever. Expanding the use of financial services offered by authorized service providers, as well as supporting the flow of international remittances and establishing appropriate consumer protection and financial education programs to strengthen financial literacy, helps build domestic savings, bolsters household and financial sector resilience to shocks, stimulates business growth and expands opportunities for people on low incomes while fostering social inclusion. An inclusive, well-functioning financial system also helps governments efficiently execute social policies (GPFI, 2014a) and extend more economic opportunity to more people.

### 1.2. The G20 Financial Inclusion Action Plan

Recognizing financial inclusion as a central pillar of the global development agenda, the Leaders of the G20 endorsed the Financial Inclusion Action Plan at the G20 Summit in Seoul 2010. The Global Partnership for Financial Inclusion (GPFI) is the main implementing mechanism of the Action Plan, providing an inclusive platform for peer-learning, knowledge-sharing, policy advocacy and coordination.

In September 2013, the G20 released the St. Petersburg Development Outlook which announced that G20 countries – in coordination with the GPFI – “will explore in 2014 options to strengthen financial inclusion work in developing countries and targeted actions to harness emerging mechanisms such as electronic payments and mobile technology that can significantly improve access; and increase uptake by increasing incentives, financial literacy, education and consumer protection for the poor, in particular vulnerable groups such as women, youth and migrants.”

### 1.3. The GPFI Markets and Payment Systems Sub-Group

In May 2014, the GPFI decided at its Hobart meeting to establish a specific sub-group to advance the use of payments, including remittances. The overall goal of the sub-group for the next five years is to advance utilization of payment systems including remittances in the pursuit of increased and sustainable financial inclusion. In doing so, the sub-group is focused on emerging technologies and business models, with an emphasis on market-based approaches, particularly through engagement with financial services providers. The updated 2014 Financial Inclusion Action Plan, agreed to by the Leaders at the 2014 Brisbane Summit, included as one of its ten action areas the expansion of opportunities for innovative technologies to increase responsible financial inclusion.

The sub-group believes that making a payment is one of the most basic and most important financial transactions in any economy. It is crucial that access to payments systems is provided in a way that makes these systems beneficial to all stakeholders and leads to sustainable financial inclusion. As a result, the sub-group works to support *inclusive* payment ecosystems, and to leverage innovative technologies and business models that support payment systems and instruments, which have the capacity to increase financial inclusion. By using digital means to reach financially excluded and

underserved populations and contributing to the range of formal financial services suited to their needs, delivered responsibly at a cost affordable to the customer and sustainable for the providers, the work of the sub-group aims to contribute to “digital financial inclusion”.

#### 1.4. Progress towards Greater Financial Inclusion & the Role of Public Authorities

The past few years have seen multiple efforts from governments and other policy-making institutions, as well as private sector actors including both banks and non-banks<sup>1</sup>, to increase financial inclusion, with impressive results. The latest data from the World Bank’s Global Findex Database shows that between 2011 and 2014 the proportion of adults worldwide who have an account with a financial institution or a mobile money provider grew from 51% to 62%. In just three years, around 700 million adults got a transaction account<sup>2</sup>. However, with two billion adults still without a transaction account, there is still much work to be done to deliver meaningful financial inclusion at a global level.

Retail payment systems have generally been initiated and operated by private entities that try to meet apparent payment needs in a market. However, as evidenced by several studies,<sup>3</sup> it is clear that there are significant public policy objectives relating to retail payments that should be pursued by public authorities in general and central banks in particular.

These public policy objectives typically have the following characteristics:

- i) Ensuring the safety and efficiency of the national payments system (NPS);
- ii) Promoting affordability and ease of access to payment services for consumers;
- iii) Promoting efficient infrastructure to underpin payment instruments and mechanisms meeting retail payment needs; and
- iv) Promoting socially optimal use of payment instruments (World Bank, 2012a).

Due to the changing needs of end users coupled with rapid technological innovation in retail payments, there is a growing need for central banks and other authorities to ensure that all stakeholders are benefiting from such innovations, and that their financial inclusion potential can be leveraged. When new payment instruments become very widely used, considerations of overall financial stability can also arise.

To that extent, the Committee on Payments and Market Infrastructures (CPMI) and the World Bank Group has published a consultative report prepared by a task force consisting of representatives from CPMI central banks, non-CPMI central banks active in the area of financial inclusion and international financial institutions. The report on Payment Aspects of Financial Inclusion examines demand and supply-side factors affecting financial inclusion in the context of payment systems and services, and suggests measures to address these issues. The report gives guidance to central banks, financial supervisors, regulators, policymakers, and private sector stakeholders for advancing financial inclusion in their markets through improved access to and usage of transaction accounts. The report suggests the following guiding principles:

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<sup>1</sup> In line with the CPMI (2014), this report defines non-banks as entities “involved in the provision of retail payment services whose main business is not related to taking deposits from the public and using these deposits to make loans”

<sup>2</sup> Transaction accounts can be defined as accounts (including e-money accounts) held with banks or other authorized and/or regulated payment service providers (PSPs), which can be used to make and receive payments and to store value. Transaction accounts can serve as a gateway to other financial services.

<sup>3</sup> See CPMI (2014), World Bank (2012a), World Bank (2012b), among others.

- i) Commitment from public and private sector organizations to broaden financial inclusion is explicit, strong and sustained over time.
- ii) The legal and regulatory framework underpins financial inclusion by effectively addressing all relevant risks and by protecting consumers, while at the same time fostering innovation and competition.
- iii) Robust, safe, efficient and widely reachable financial and ICT infrastructures are effective for the provision of transaction accounts services, and also support the provision of broader financial services.
- iv) The transaction account and payment product offerings effectively meet a broad range of the target population's transaction needs, at little or no cost.
- v) The usefulness of transaction accounts is augmented by a broad network of access points that also achieves wide geographical coverage, and by offering a variety of interoperable access channels.
- vi) Individuals gain knowledge, through financial literacy efforts, of the benefits of adopting transaction accounts, how to use those accounts effectively for payment and store-of-value purposes, and how to access other financial services.
- vii) Large-volume and recurrent payment streams, including remittances, are leveraged to advance financial inclusion objectives, namely by increasing the number of transaction accounts and stimulating the frequent usage of these accounts.

While the work for the present document started before the publication of the report on Payment Aspects of Financial Inclusion, all those guiding principles relevant for digital payment mechanisms have been reflected in the methodological framework. Guiding principle 3 is reflected in foundational infrastructure innovations, guiding principles 4 and 6 in service and product design innovations, guiding principle 5 in access and delivery channel innovations and finally guiding principle 7 in the potential for scalability, replicability and sustainability.

### 1.5. Taking Stock of Payment Innovations: Major Work to Date

In recognition of the retail payment innovations taking place around the world, in 2010 the World Bank conducted a survey of innovations, capturing both retail payment instruments and methods. A total of 101 central banks completed the survey, and 173 innovative retail payment instruments and methods were reported (World Bank, 2012b).

In 2012 the Committee on Payments and Market Infrastructures (CPMI, formerly known as CPSS) of the Bank for International Settlements conducted a fact-finding exercise on innovative retail payments amongst the CPMI member central banks (and selected other countries). In total, 122 innovations in retail payments were reported by 30 central banks, 21% of which included in their purpose the aim of supporting the financial inclusion of unserved and underserved people<sup>4</sup>.

In 2015 CGAP extended the area of interest to more types of digital financial services and instruments, not only limited to payments. Of the 300 channels examined, over 100 were identified as innovations.

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<sup>4</sup> Often also referred to as “unbanked and underbanked”.

## 1.6. Purpose of this Report

As is evident in the above work by the World Bank, CPMI and CGAP, it is vitally important but also very difficult for stakeholders to track and record digital payment innovations in a structured format. The purpose of this report is to provide visibility into the business models and technologies behind innovative payment mechanisms that have the potential to increase financial inclusion, particularly in low-income markets. Although not all innovations examined in this report have been made with the unserved and underserved in mind, many of them can nonetheless be used to facilitate financial inclusion.

In view of the high pace of innovation in payment services, the aim of this paper is not to produce an exhaustive inventory of all initiatives. Rather, it offers a conceptual framework that allows market developments and new innovations to be assessed regularly (e.g. every second year), by assigning new service offerings to the categories suggested in the conceptual framework and tracing the impact of existing service offerings over time. This would allow an evaluation of whether identified types of business models/technologies really fulfill their financial inclusion potential and any necessary change or enhancement of the typology due to market developments.

The findings of this report are expected to serve as a basis for a separate report discussing the role of the public and private sectors in leveraging the identified innovations to boost responsible financial inclusion.

### **Box: Stocktaking of Digital Payments Innovation and Selection of Examples**

Consistent with the mission of The World Economic Forum (WEF)'s Global Financial Inclusion initiative (established in 2013) and the GPI's Markets and Payment Systems Sub-Group, with the International Finance Corporation (IFC) and the World Bank as the leading implementing partner of both initiatives and in cooperation with the Better than Cash Alliance, Consultative Group to Assist the Poor (CGAP) and Alliance for Financial Inclusion this stocktaking exercise was selected to spotlight cases that leverage technology and innovative business models for the development of payment systems and payment instruments to promote and advance financial inclusion (e.g. the use of mobile financial services). A joint survey exercise was conducted from July to September 2015. The aim was to collect and feature innovative cases and business models that exemplify how developing of digital payment systems and payment instruments promote and advance financial inclusion. Particular focus of the stocktaking collection is on the merchant (MSME) target segment in the retail sector (business to business and consumer to business) and government-led initiatives such as government payments (G2P) in emerging and developing economies. This joint survey used the conceptual framework developed in this report and aimed to collect and feature innovative cases and business models that exemplify how digital payment systems and payment instruments promote and advance financial inclusion. The results of this survey were used by the participating organizations on concurrent research exercises looking at the role of innovation in digital payments at the consumer and merchant level.

In addition, other cases were carefully curated after discussions with technical experts, entrepreneurs and investors representing a wide variety of sectors and regions.

## 1.7. Structure of this Report

This report first examines innovations to the foundational infrastructure that enables digital payments to deliver greater financial inclusion through access and adoption of financial services (Part 2). The report then explores specific innovations relating to products and services (Part 3), and access and delivery channels (Part 4). The report concludes with a first discussion of the main innovation characteristics that influence their capacity to deliver large-scale digital financial inclusion: whether it is based on a sustainable business model, whether the technology can be scaled, and whether it can be adaptable in various markets or segments within a market.

By assessing and cataloguing innovations based on the conceptual framework developed in this report and deepening the analysis based according to their scalability, replicability and sustainability potential (Part 5) based on specific use cases, e.g. government payments, this report aims to provide a practical tool for policymakers across all sectors as they seek new ways to bring the benefits of digital payments to all stakeholders and their contribution to financial inclusion. This structure is set out below in Figure 1 which summarizes the conceptual framework applied in this report; the individual elements are explained briefly below and discussed in more detail in the respective chapters.

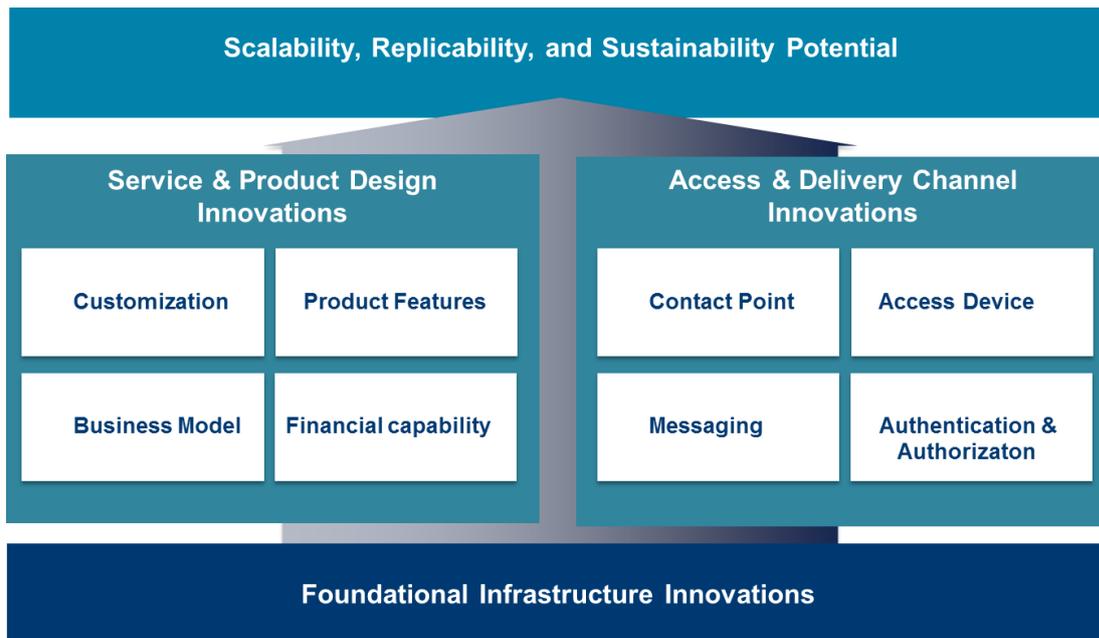


Figure 1: Conceptual framework applied in this report

### Foundational Infrastructure Innovations

**Electricity Supply:** Digital payment mechanisms, by their very nature, depend on a reliable electricity supply, something that is often a challenge in many areas, both urban and rural, in developing countries

**ICT infrastructure:** Mobile phone networks often do not appropriately cover sparsely populated, rural areas where they are most needed to enable mobile money<sup>5</sup> solutions, with appropriate voice, text messaging and/or USSD services. A similar, but more severe, problem exists with regards to mobile and fixed-line internet access.

**Payment Infrastructure:** Digital payment mechanism can be more efficiently offered, if basic payment infrastructures are in place and can be leveraged for that purpose. Among these payment infrastructures are automated clearing houses and payment switches.

**Identification Infrastructure:** Access to financial services is severely hampered in many countries by a lack of adequate identification infrastructures. Digital and biometric ID technologies can help financial service providers make better decisions.

### Service and Product Design Innovation

**Customization:** Citizens that are currently financially unserved or underserved often have specific needs, habits and levels of literacy and technological knowhow that differ from other market segments. In order to improve the access to and use of financial services by previously unserved and underserved, financial service providers need to research and design new products and services, or appropriately tailor existing ones, to meet their real, as opposed to imagined, needs.

**Product Features:** Perceptions of risk, availability of funds, cost, acceptance, and convenience play a critical role in influencing adoption and usage of financial services by consumers, businesses and governments alike. Digitization of basic offerings can improve the opening of transaction accounts, make funds easier to obtain, and provide value-added services that may provide an on-ramp to more advanced financial products and services.

**Business Model:** Financial service providers can leverage digital technologies to cut costs and bring products and services to segments, for which previously a commercially viable service offering was not possible. Innovative pricing structures may also be needed to take account of the low and often fluctuating incomes of currently undeserved and underserved potential customers.

**Financial Capability:** Improving consumers' financial capabilities is a key strategy for financially including underserved and unserved people. A combination of familiarization, such as using simulations, demonstrations, and online and mobile-delivered financial education can pave the way to consumers getting comfortable with new technologies and financial products.

### Access and Delivery Channel innovation

**Contact point:** The physical proximity of users to service providers is widely considered a key factor in financial inclusion, and distance from an access point of a financial institution is widely cited by unserved and underserved populations as a major impediment to opening an account. Digital technologies are providing innovative ways to increase proximity without the need to massively expand branch networks, among others by allowing to access transaction accounts remotely.

**Access Device:** For decades the primary non-cash payments device has been the plastic magnetic-stripe card, although this has been giving way to cards with electronic chips embedded in them. In many low- and middle-income countries, however, mobile phone penetration (both feature phones and smartphones) is considerably higher than smart card penetrations, offering a huge potential to use the mobile phone as an access device to financial services.

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<sup>5</sup> Mobile Money: E-money product where the record of funds is stored on the mobile phone or a central computer system, and which can be drawn down through specific payment instructions to be issued from the bearers' mobile phone. It is also known as m-money. Source: World Bank, 2015d.

**Messaging:** Innovation in data transmission can improve security and reliability, and improve the speed and quality of the interaction between payer and payee and between payment service providers and payment infrastructures.

**Authentication and Authorization:** Closely related to identification infrastructures, digital authentication and authorization, using biometric and similar technologies, are making digital payment mechanisms often easier to use and more secure, increasing trust and confidence in them.

### Scalability, Replicability and Sustainability

For innovations to contribute to greater financial inclusion in the future, it is imperative to have the capacity to scale up payment innovations and leverage their benefits for larger volumes of payments; the potential to replicate innovations in different contexts; and the potential of those innovations to build on sustainable business models. Large volume use cases like government collections and disbursements can contribute to a critical mass of digital payment usage, catalyzing the ‘network effect’, and helping to make the scalability and sustainability much more readily achievable. The potential of the individual innovations mentioned in this report has not been specifically assessed, but it is assumed that any provider of innovative payment mechanisms has the ambition to scale up its business, replicate – where possible – them in new contexts and offer the service in a sustainable manner.

**Box: GPI's Definition of "Financial Inclusion" Key Terms**

- **"Financial inclusion"** is a state "in which all working age adults have effective access to the following financial services provided by formal institutions: credit, savings (defined broadly to include current accounts), payments, and insurance."
- **"Effective access"** involves convenient and responsible service delivery, at a cost affordable to the customer and sustainable for the provider, enabling financially excluded and underserved customers to access formal financial services, according to need.
- **"Responsible service delivery"** involves both responsible market conduct by providers and effective financial consumer protection oversight. The specific characteristics of excluded consumers have significant implications for effective consumer protection regulation and supervision, and therefore also SSB standards and guidance aimed at enabling financial inclusion.
- **"Digital financial inclusion"** refers broadly to the use of digital financial services to advance financial inclusion. Digital financial inclusion involves using digital means to reach financially excluded and underserved populations with a range of formal financial services suited to their needs, delivered responsibly at a cost affordable to the customer and sustainable for the providers.
- **"Digital transactional platform"**. A digital transactional platform enables a customer to make or receive payments and transfers and to store value electronically through the use of a device that transmits and receives transaction data and connects—directly or through the use of a digital communication channel—to a bank or non-bank permitted to store electronic value.
- **"Digital financial services"**\*. The use of digital technologies (internet, mobile communication technology) to access financial services and execute financial transactions. This includes both transactional and non-transactional services, such as viewing financial information on a user's mobile phone.

Sources: GPI White Paper (2011); GPI Issues Paper (2014b); AFI (2013).

\* The definition of "digital financial services" has been adapted, based on the definition of "mobile financial services" in AFI (2013)

## 2. Foundational Infrastructure Innovations

Innovative digital payment mechanisms require a foundation of reliable and efficient infrastructures if they are to be offered in a user-friendly, secure, and cost-effective manner. If achieved, this has the potential to increase financial access and levels of financial inclusion. Set out below are key elements of foundational infrastructure, along with recent innovations that have strengthened this infrastructure in support of digital payments.

### 2.1. Electricity Supply

A reliable electricity supply is vital to digital payments, as power supply interruptions negatively affect payment service users, suppliers and access points. A lack of power to operate ATMs, particularly in rural areas, is often among the main reasons cited by payment service providers for not deploying ATMs more widely. Geographic areas with the highest rate of financially unserved and underserved people are typically also those without reliable access to electricity<sup>6</sup>. According to the International Energy Agency, 18% of the global population lacks access to electricity, despite modest improvements in recent years. More than 95% of these people are either in Sub-Saharan African or developing Asia, and 84% are in rural areas (IEA, 2015). Below are various exemplary innovations seeking to address this challenge.

#### Vendors are offering solutions that minimize the impact of power outages on ATMs.

Chennai-based Vortex Engineering builds and installs low-cost ATMs in rural and semi-urban India that consume one-sixth the power of regular ATMs. Vortex's Ecoteller ATM consumes 60 watts of electricity – the equivalent power consumption of a 60-watt light bulb – and the company claims this is by far the lowest power consumption of any ATM in the world. It can operate without air-conditioning from 0 – 50 degrees Celsius and can cope with power fluctuations and power failures. Some Vortex models come with solar power cells on top of the ATM.

Vortex ATMs started as a pilot project for India's largest bank, the State Bank of India, in 2008. In 2009, the State Bank of India ordered 545 ATMs, of which 300 were solar. By 2011 Vortex was selling to Nepal, Bangladesh, Djibouti and Madagascar. Other ATM manufacturers have started to leverage solar power for ATMs as well. The company ATM Solutions, for example, installed solar panels that produce power and store it in a battery while the ATM is connected to the electricity grid. When a power outage occurs, the stored solar energy takes over powering the ATM. The first such ATMs were rolled out in South Africa. Major ATM manufacturers like Diebold or NCR are also following suit and including solar-powered ATMs in their product suite (Businesstech, 2014; Jetlay, 2014; Vortex).

#### Solutions for charging phones conveniently and at low costs are of relevance for digital payment mechanisms relying on mobile phones.

The scarcity of electricity in many Sub-Saharan African regions can result in costs for charging a phone of USD 0.25 or more, not including transportation costs to travel to a charging device or facility. Many individual entrepreneurs in Africa are investing in solar cells on the roofs of their outlets in order to

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<sup>6</sup> See World Bank, Sustainable Energy for All (SE4ALL) database - Access to electricity is the percentage of population with access to electricity: <http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>

offer mobile phone charging services. Similarly, various companies are working on products based on kinetic or solar energy.

Two U.S. engineering students are testing their foot-powered cell phone charger in rural villages in sub-Saharan Africa. They aim to go into mass production and to substantially reduce the current production costs of USD 12 per unit to allow for an end user price of USD 5 per unit. If realized, this price would undercut the price of other solutions, such as the wearable charger Ampy, which uses the energy created by walking, biking or running to power cellphones.

Kadi Energy, established in the USA to improve life conditions in Ghana's rural areas, has developed a solar-powered mobile device charger that can store enough power for 14 cellphone charges and features two charging ports capable of powering personal devices ranging from cell phones to laptop and lamps, at the price of USD 25-30 per unit. Despite using traditional battery technology, this power bank lasts twice as long and charges 1.5 times faster than other power banks currently in the market.

## 2.2. Information and Communications Technology (ICT) Infrastructure

Similar to power supply, the quality and affordability of ICT infrastructure has direct effects on users, providers and access points. By August 2015 there were 7.5 billion mobile phone subscriptions globally (up from 6.3 billion in 2012). It is estimated that globally 3.2 billion people will have access to the internet by the end of 2015 (up from 2.5 billion in 2012), of which 2 billion will be in developing countries. (World Bank, 2014a; GSMA, 2014a; ITU, 2015). Each of these connections has the potential to enable digital payments.

However, in order to use mobile phones to make payments, adequate network coverage is needed. Based on population density and mobile coverage data, recent research by the Evans School of Policy Analysis and Research at the University of Washington shows that 11.7% of the world's population (just under 821 million people) lived in areas without mobile coverage in 2012. Over nine in ten people who do not have network coverage live in rural areas, often characterized by low population density, poor road networks, difficult geography, and lack of proximity to electricity grids. As a result, there is often little incentive for mobile network operators (MNOs) to expand into these areas (Biscaye et al., 2015). Some countries seek to mitigate this problem by issuing operator licenses to several MNOs and/or making certain minimum areas of network coverage a condition of licenses. Depending on the jurisdiction, MNOs on their own or via their subsidiary might not only provide access to telecommunication infrastructure but act as a payment service provider on their own.

Like mobile telephone use, internet use is strongly correlated with income. Since 2000, internet users in developing economies have grown 28% a year, but the low-income economies of South Asia and Sub-Saharan Africa lag behind (World Bank, 2014a). McKinsey (2014) estimates that in the 20 countries with the largest offline populations in 2013, 64% of the offline individuals live in rural areas. Half of these offline individuals had an income below their country's poverty line. Approximately 28% of the offline population is illiterate and 52% of the offline population is female.

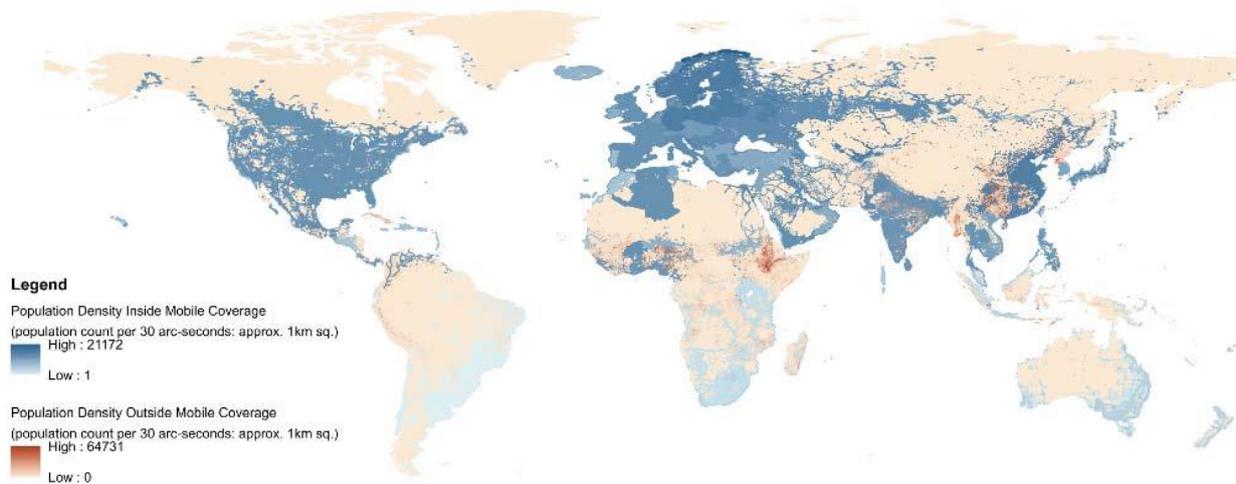


Figure 2: Global population density of areas with and without mobile coverage (Source: Biscaye et al., 2015)

Unreliable or non-existent network coverage is a key impediment to greater take-up of digital financial services. For example, the most common complaint from mobile money customers in the Democratic Republic of Congo was related to the unreliability of the GSM network. Gilman et al. (2013) conclude that MNOs need to ensure the reliability of GSM networks in order to give customers (business and consumers alike) confidence in mobile money. Such reliability is particularly important for low-income groups who are especially reliant on their mobile money wallets and have no alternatives for making digital payments. Below are various innovations seeking to address the challenges of poor ICT infrastructure.

### Increased competition and conditional licensing requirements can substantially improve a country's ICT infrastructure.

In Myanmar, the number of active SIM cards has increased 18-fold within three years. According to Ericsson, only about one million people in Myanmar had access to mobile phones in 2012. SIM cards, which sold for thousands of dollars when they were first introduced, cost around USD 200 in 2013. Since then the market has made remarkable progress due in large part to increased supply and competition. Ooredoo launched its service in August 2014, followed by Telenor a month later. The two providers now operate in addition to the local provider MPT, which has partnered with Japan's KDDI Corp. Despite some delays due to intense negotiations of telecommunication tower contracts, the existing tower deployment has already considerably increased the range of Myanmar's network. Tower sharing is considered to be a cost-efficient option for MNOs that might also speed up the rollout process. While currently not broadly utilized in Myanmar, it is expected to become increasingly important when MNOs start rolling out telecommunication towers in more rural areas. The increased supply of SIM cards by more than one MNO has helped bring the price of a SIM card down to about USD 2. As of May 2015, at least 18.1 million SIM cards were reported in active use in Myanmar.

Licensing requirements can also have a marked positive impact. Under the terms of their 15-year license, foreign operators in Myanmar are required to provide voice services across three-quarters of the country and data services across half of the country within five years of starting operations (Ferrie, 2015; Hammond, 2015).

### International activities aim to make the internet accessible and affordable for everyone.

In 2013, Facebook along with six partners<sup>7</sup> launched the Internet.org initiative, and succeeded in connecting more than 9 million people to the internet in one year. To do this they provided 100 basic internet services, including tools for communication, health services, education, and local news. Internet.org has been working with operators in 17 countries and has been launched in Colombia, Ghana, India, Kenya, and Tanzania.

GSMA's Digital Inclusion program seeks to build the conditions that will enable an additional one billion people to access the mobile internet by 2020. Google, UKAID, and USAID lead the Alliance for Affordable Internet (A4AI), a coalition of private, public and civil society organizations working to enable affordable access to both mobile and fixed-line internet in developing countries.

In parallel, some MNOs are introducing innovative pricing models better suited to the economic realities of a low-income consumer base. For example, 'Sachet' data tariffs allow for prepaid users to consume data on a 'pay as you go' basis and have become increasingly popular in Asia and Latin America. Another model is 'sponsored internet', in which the content provider, instead of the end-user, pays for connectivity. For example, customers of Banco Bradesco in Brazil can access its internet banking service from their mobile phones without incurring carrier data charges or having to use their own monthly data allowance (Almazán and Sitbon, 2014; Internet.org; A4AI).

### 2.3. Payment Infrastructure

To operate effective financial services<sup>8</sup>, including transaction accounts and digital payment mechanisms, certain financial infrastructure is required. This includes payment infrastructure (e.g. payment switches, clearing houses, large-value settlement systems), as well as certain data-sharing and information systems (e.g. credit reporting systems, collateral databases). Additionally, certain institution-level infrastructure, such as centralized account management systems (often referred to as core-banking systems), improves the commercial viability of providing financial services to lower income groups.

Interbank systems for retail payments (automated clearing houses for electronic fund transfers and/or cheque clearing houses) and payment switches (typically for card transactions but increasingly for mobile money as well) make it possible to process a large number of payments in a fast, secure, and cost-efficient way. A central clearing house or switch (or several interoperable ones) provides a hub for processing interbank transactions. This lifts the quantity and efficiency of those transactions, and effectively expands the network of access points (e.g. ATMs, POS terminals, agents, or branches) for individual customers. While access to systems may be limited for a number of valid reasons; however, such restrictions must be transparent, proportionate, and non-discriminatory. Since the main reason for limiting access relies on risk, an adequate protection from risk according to the services provided should reduce the urgency (although not the general necessity) of access restrictions to clearing and settlement (World Bank, 2012e).

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<sup>7</sup> In partnership with Ericsson, MediaTek Inc., Opera, Samsung, Nokia, and Qualcomm.

<sup>8</sup> This paper focuses on the financial infrastructure needed to address the payments needs and, as such, will not further address savings, credit, and insurance, for which reason only payment infrastructures are discussed in this section.

In many low-income and in some middle-income countries, it is often not profitable for commercial banks and other financial service providers to expand their traditional payment and banking infrastructure beyond major urban areas. The challenge of commercial viability, along with the technological challenges discussed above, are often compounded by human resource issues (e.g. lack of staff with basic IT skills). Collectively, these problems frequently leave certain geographic areas or customer segments unserved or underserved. Legal, regulatory, and governance issues can add to these challenges. For example, certain service providers such as non-bank mobile financial service<sup>9</sup> providers, credit cooperatives, savings and credit cooperatives (SACCOs) and micro-finance institutions (MFIs) sometimes struggle to meet the technological and risk management requirements of participating in key payment infrastructures.

Similar to a core banking system, specialized mobile financial service (MFS) providers also need a core system that supports activities conducted by the customer, such as mobile transactions. Such a system needs to also support the activities of MFS agents, which are the “branches” of a MFS provider, as well as the activities of the provider itself. These systems need the ability to interface with other payment infrastructures (e.g. payments switches). However, many of the early MFS core systems deployed are no longer adequate for the current needs and increased volumes of users in some markets (McGrath and Lonie, 2013). Moreover, non-performing payment infrastructure can have major adverse effects on business operations and confidence in MFS.

For example in Uganda, 92% of mobile money agents report having experienced server downtime in the past, with huge differences in the quality of service experienced across different providers. Only 48% of agents in Uganda report having received prior warnings about service interruption. Agents reported losing, on average (median), 10 transactions per day for each occurrence of server downtime. Recent analysis suggests Ugandan agents could increase their daily transactions by 33% if this issue of server downtime was resolved (Githachuri et al., 2014; Parada and Bull, 2014).

Below are various innovations seeking to address challenges associated with payment infrastructure.

### Outsourcing services can help payment services providers who face challenges participating directly in key payment infrastructure.

For smaller licensed payment service providers, be they banks, MFIs, SACCOs or other non-bank entities, often substantial start-up and/or ongoing costs for direct participation in payment infrastructures might prevent them from offering payment services efficiently. Moreover, legal, regulatory, and/or payment infrastructure system rules might prevent certain type of providers to participate directly, even if they could afford the necessary investments into their infrastructure and operations or the participation fees. By partnering with commercial banks, technical service providers can provide authorized and/or regulated non-bank payment service providers (e.g. depending on the jurisdiction MNOs or their subsidiaries) with an access channel to the national payment systems infrastructure that they would otherwise not be able to access, given the local legal and regulatory framework.

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<sup>9</sup> Mobile financial services include a diverse range of financial services that are delivered using a mobile phone. Two commonly distinguished categories are mobile banking services, through which a bank’s clients connect to their accounts at the bank via their mobile device, and mobile payment services, which cover a broader range of payment services that may not be offered by a bank but always involve one (AFI, 2010).

Similarly, by concentrating the business for smaller banks, SACCOs and MFIs via technical service providers and indirectly accessing payment infrastructures via larger payment service providers, economies of scale can be leveraged and/or direct participant fees spread over more institutions.

South African technology company TYME (which stands for 'take your money everywhere'), acquired in early 2015 by Commonwealth Bank of Australia, currently hosts and operates mobile money services for MTN in South Africa in partnership with the South African Bank of Athens and retail company Pick n Pay. At the end of June, MTN had 2 million mobile money customers in South Africa. TYME is also providing hosted services for EBank in Namibia (Owusu-Nyantakyi, 2015). The foundations of TYME were laid through a Deloitte Consulting project funded by MTN. In June 2012, the venture was spun out of Deloitte, and TYME was established as a stand-alone business.

Tangazoletu, a software company in Kenya, developed an application called Spotcash that allows clients at SACCOs and MFIs to transfer cash to and from their savings account by sending an SMS to the financial institution. The money is then transferred to or from the client's M-PESA mobile money account.

#### Joint payment switches used by banks and non-banks have been established in several countries.

In Peru the Association of Banks, along with other partners, has established a mobile payments platform that can be used by all financial institutions, mobile phone operators, and electronic money issuers in the country. The "Peru Model" allows all financial intermediaries in the country to participate without limitations in the platform and aims to create shared infrastructure for low-income consumers. The initial investment of the partnering institutions is USD,10 million. 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. Merchants and agents will be fully interoperable, and the goal is to reach around 20,000 shared agents (Almazán and Frydrych, 2015; Navajas, 2015).

The Central Bank of Egypt has mandated a joint switch solution to be used by banks and non-bank mobile payment providers. The Egyptian Banks Company (EBC), which operates the national switch, was assigned to establish an integrated switch in cooperation with MasterCard. All banks and MNOs can interact on the platform, on which mobile payment transactions are converted into card transactions and are processed like any payment card transaction at the automated clearing house (Faragallah et al., 2015).

#### Interoperability between the infrastructures of different payment service providers can be an alternative in the absence of a single joint platform.

In 2013, Indonesia's three major mobile operators<sup>10</sup> all launched interoperable services that enable their mobile money customers to transfer money across each other's networks. According to GSMA, this was the first time mobile money platforms run by mobile operators could interoperate in real time. The technical development that enabled the platforms to talk to each other took place over four months, with two of the operators developing their platforms in-house, and the third purchasing their core platform from an external mobile money software vendor (Camner, 2013).

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<sup>10</sup> Telkomsel, Indosat and XL.

In 2011, the Bank of Tanzania and some MNOs observed that MFS users were favoring alternatives to direct wallet-to-wallet transfers, such as managing multiple MFS accounts and making cross-carrier payments via vouchers. These behaviors suggested a clear demand for cross-network payments. In 2014, Tanzania successfully implemented standard business rules for interoperable mobile payment transactions. Currently, registered users can receive and send money directly to one another's mobile money accounts under rules developed at the industry level governing those payments (Kabendera, 2015; IFC, 2015).

### Interoperability can support market competition and help achieve economies of scale by using existing infrastructures.

Although mobile money has seen substantial adoption in Africa, its capacity has been limited in some markets since most solutions have been developed to operate only within the network of a particular MNO. While in Ghana and Nigeria interoperability has been imposed by regulators from the outset of mobile money, in Tanzania key market players have started gathering to develop rules for an interoperable scheme. In other African countries so called "aggregators" have sought to create interoperability between different systems. In parts of the retail payment market, the different types of new payment mechanisms created as a result of innovation have increased the complexity for payees, especially if they each have different interface requirements. This situation creates the need for payment aggregators or payment gateways, services that are typically provided by non-banks. Payment aggregators provide services and infrastructure to link the systems of merchants with those of banks (CPMI, 2014).

### Leveraging existing infrastructures can provide opportunities for low cost remittances and increase usability.

Money transfer company TransferWise seeks to circumvent the complexity and associated costs of transferring money across international borders by matching transactions at the domestic level. For example, if User A wants to send money from the USA to France, the company receives User A's money in USD and seeks a second user (User B) who wants to transfer funds from France to the USA. The company then uses User B's euros to complete User A's transfer and vice versa. While currency is changing hands internationally, the funds are actually not transferred across international borders (Spinks, 2015) and they are used within the country to complete the transaction of other originators. In another case, rather than establishing its own extensive network, money transfer company Xoom uses electronic channels on the sending side to receive money, and has partnership agreements on the recipient side with banks, financial institutions and other disbursing networks to transmit money leveraging the already existing payment systems infrastructure and payout channels (Daly, 2015).

### Distributed ledger technology, first seen in virtual currency schemes like Bitcoin, has various potential applications

Virtual currencies are different from e-money, which is defined in many jurisdiction as a digital representation of money with legal tender status. E-money can be redeemed at par value in legal tender, virtual currency is not backed by legal tender and additional units of virtual currency are typically created independently from the official legal currency of a country. In the case of so-called crypto-currencies, additional units are created by solving math-based puzzles.

As of today no virtual currency has official legal tender status<sup>11</sup> in any jurisdiction, nor can virtual currencies be considered as broadly accepted payment services. Unlike for legal tender and regulated payment instruments, public authorities and authorized payment service providers play at present no role in the issuing, oversight and/or redemption of virtual currencies.

Virtual currency schemes can have several drawbacks and disadvantages for users, and frequently lack safeguards to protect users against risks. Some observers view the more promising innovation to be the underlying distributed ledger<sup>12</sup> technology, rather than the “currency” or asset aspect of virtual currency, with possible applications in securities, cadasters, loyalty and notary services, e-identification and e-invoicing (ECB, 2012; ECB, 2015; Innopay, 2014).

## 2.4. Identification Infrastructure

Although not always directly linked to financial services, adequate identification infrastructure that can be efficiently accessed by financial service providers plays an important role in supporting financial inclusion. The requirement of identity credentials as a condition to access financial services, can create an additional exclusionary barrier if it is difficult to obtain a proof of identity. The possibility to quickly validate IDs is very important from a KYC-perspective. In order to be useful from a financial inclusion perspective, ID infrastructures need to be robust to meet KYC requirements, and support mechanisms for efficiently verifying a person’s identity (including through online platforms or biometric IDs) (Dahan and Gelb, 2015).

In parts of Sub-Saharan Africa, as much as 55% of the population has no official identification record. This severely hampers access to a range of basic services including financial services. Driven by the rapid growth of mobile phone ownership, digital IDs can help meet the needs of previously isolated and impoverished populations. National ID infrastructure can use electronic and biometric technologies to confirm user identities and boost access to financial services. Further, governments can share the costs of such systems, including through public-private partnerships that provide sustainability and scalability, bolster innovation and produce revenue streams (World Bank, 2014b).

Below are various innovations seeking to improve identification infrastructure or address challenges associated with identification.

### Integrating payment infrastructures with ID infrastructure supports efficiency gains and the creation of digital payment histories for collateral purposes.

India has already invested in key components of ID infrastructure that can support and enable digital payments. Unique 12-digit identification numbers, also referred to as Aadhaar, allow account opening and usage by linking the user to the core-banking server. Through an associated payment system that uses these unique ID numbers, every payment made by the Ministry of Rural Development, for

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<sup>11</sup> Even though virtual currencies have no legal tender status, they may be convertible into fiat currency.

<sup>12</sup> “Distributed” refers to an essential feature of decentralised math-based virtual currencies: transactions are validated by a distributed proof-of-work system. Each transaction is distributed among a network of participants who run the algorithm to validate the transaction and the transaction is recorded in a ledger (FATF, 2014). Thanks to the decentralized consensus mechanism there is not one single individual, company or public institution that claims the truth on ownership of assets, but instead the ‘crowd’ holds a public ledger that is continuously confirming and securing who owns what (Innopay, 2014)

example, can be tracked until it is deposited in the recipient's account. India's ID infrastructure is also linked to the "Central Plan Scheme and Monitoring System", which tracks the disbursement of government funds from the federal to the state levels (Banerjee, 2015).

In Nigeria, the Nigerian Identity Management Commission (NIMC) launched a pilot with MasterCard-branded identity cards ('eID cards') with electronic payments functionality in August 2014, and 13 million Nigerians were issued eID cards in the pilot phase. NIMC is working with several government agencies to integrate all identity databases including for Driver's Licenses, Voter Registration, Health Insurance, Tax, SIM registration and the National Pension Commission (PENCOM) into a single, shared services platform. The eID card is a key component of the Nigerian Identity Management System, operated by NIMC's mandate to create and maintain the country's first central National Identity Database providing proof of identity to Nigerians 16 years and older. The ID card contains 13 applications, including Cryptovision's biometric identification technology and prepaid payment technology (MasterCard, 2014; NIMC, 2015).

### 3. Service and Product Design Innovations

While the payment behavior of consumers is generally considered to change slowly, it is also clearly influenced by service and product design features. In order to substantially increase the usage of digital payment mechanisms that support financial inclusion, products should have a user-centric design with the needs of the financially unserved and underserved in mind. Products and services must offer features that are useful to them, and are affordable, in order to avoid these segments ending up being "irrelevantly banked". It is also important that prospective users are able to test payment mechanisms in order to build up acceptance of those mechanisms.

Consumers are often not well informed when it comes to their rights and obligations with regard to payment services, and to the possibilities electronic payment instruments offer. This results in a lack of trust, inhibiting greater usage of electronic payment services. Payment mechanisms that are not well designed to meet the payments needs of the unserved and underserved are unlikely to be widely adopted, which may adversely affect broader financial inclusion beyond payments.

Payment mechanism that have been successfully deployed in one market – be it developed or developing – will not necessarily be accepted by users in other markets. Aligning payment mechanisms with the needs of the unserved and underserved, as well as with country-specific conditions, is therefore key. Innovations that focus on customization, real value-added product features, sustainable business models and customer education can have an impact in increasing digital payments and boosting financial inclusion.

#### 3.1. Customization

Customization refers to identifying a target group, analyzing its characteristics and needs, and designing services and products accordingly. Customization can help reach a broader customer base by offering more relevant and useful services to unserved and underserved markets, and providing a better user experience. For example, research shows that women in traditionally underserved communities pay particular attention to convenience, reliability, security, and privacy of financial services. Research in Indonesia, Kenya, Pakistan, Papua New Guinea, and Tanzania conducted by

Bankable Frontier Associates (BFA) (2013) shows that payment service providers do not necessarily have to create new services, brands or distribution channels in order to appeal to female customers, but can effectively tailor existing products and services to meet women's need, which can also increase customer loyalty among male customers at the same time. . Innovations that are currently using customization to good effect are set out below.

### Local language options and a straight forward user interface can increase ease of use .

Based on research in Uganda, India and the Philippines, the Grameen Foundation observed that introducing a streamlined and more intuitive navigation process for mobile financial services, and adapting language and content to local needs, can result in greater adoption and usage. The Grameen Foundation cites the example of India, where existing mobile financial service offerings require between 12 and 16 steps to complete simple transactions, such as checking an account balance. As a result, there are numerous points at which it is possible for users to make errors. In fact, new users made on average 25 errors in attempting to complete a single transaction on leading mobile financial services offerings. Participants encountered problems reading text on screens (mostly due to small font size), and some users with low levels of education did not understand the decimal point, creating insecurity about transfer amounts and balances. Further, menus were often in English or used terminology that was not commonly understood. As a result, some users tried to memorize the steps to complete a transaction, which proved to be difficult due to the large number of steps involved (Nestor, 2014).

Limiting the number of steps to be conducted by a user and offering local language can increase adoption of digital payment mechanisms by the unserved and underserved, as well as by existing customers.

### Technological innovations can make it easier for users with low levels of literacy or numeracy to access financial services.

The global adult literacy rate for the population 15 years and older was 80% for women and 89% for men in 2012. Despite an improving trend, 781 million adults still could not read or write in 2012, two-thirds of whom (496 million) were women. In more than a dozen countries, mostly in Sub-Saharan Africa, fewer than half of all adults had basic literacy skills. A strong correlation between countries with low basic literacy and low levels of financial inclusion can be observed (UNESCO, 2014).

Diversifying the types of interfaces customers can use to access their transaction accounts can help address the needs of customers with low levels of literacy or numeracy. For example, Interactive Voice Response (IVR)<sup>13</sup> technology can be adapted to numerous local languages and dialects, addressing the needs of people who cannot interact with data services on a mobile handset due to literacy issues. With the increasing adoption of smartphones, well-designed apps can dramatically improve user experience by providing self-explaining functionality, using a combination of pictures and text. This approach can also be taken with ATMs and other access devices, combined with appropriate financial education. Interactive voice response (IVR) can help overcome barriers caused by low levels of literacy. In order to use IVR to make payments, consumers need to dial a number provided by their mobile

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<sup>13</sup> IVR (Interactive Voice Response) technology allows people to interact with computers through the use of voice and DTMF (dual-tone multi-frequency signaling) tones input via keypad.

money provider and choose the service that they require by listening to a pre-recorded menu and selecting their preferred option on the phone's keypad. IVR can be very easy to navigate for customers with low levels of literacy as they can hear the menu in their own language, however it can be relatively costly to implement (Sing et al., 2014). Although IVR can be particularly suitable for low-income markets with low levels of literacy, it may be difficult to implement in areas with multiple languages or dialects (Frydrych and Aschim, 2014).

In Ethiopia, the helloCash service offered by some banks and MFIs is available in five languages via IVR. IVR is also being used not only for mobile payments, but also for basic banking services (Frydrych, 2015, GSMA, 2015). ATMs with biometric features, discussed in section 4.4, can help address the needs of people with low levels of literacy or numeracy.

### Basic “no-frills” services and/or accounts can help meet essential financial service needs at low cost and serve as an entry point to more sophisticated services.

Various basic services accounts have been developed and are currently offered in many countries, although with varying success. Providers of these accounts are often banks, but some non-bank PSPs (e.g. post offices) also offer them.

As part of its analytical work, the CPMI-World Bank Group Payment Aspects of Financial Inclusion (PAFI) Task Force obtained information from its members on basic accounts in their jurisdictions (some members also provided information from other jurisdictions or broader regions). There is recognition of the important but specific role that basic accounts could play in countries' overall financial inclusion strategies.

For a majority of respondents, basic accounts were being offered via deposit-taking institutions (including banks), although in some cases authorized agents, post offices and selected retailers were also involved in the provision of basic accounts. Basic accounts that are offered without any associated fees often have a requirement of a minimum balance. In other countries, basic accounts do involve a fee, although the fee is typically very low. In the latter case, these basic accounts do not tend to involve the requirement of maintaining a minimum balance. The provision of basic accounts is reported to be a market-led initiative in the majority of countries, although in some jurisdictions providers are obliged by legal/regulatory requirements to offer basic accounts were the exception (PAFI, 2015).

One example of a basic bank account arises from *Bank On* - a US initiative in which low-cost transaction and savings accounts are made available by federally insured banks and credit unions in the USA on terms that are generally appropriate to people with limited means, who lack familiarity with banking services, and/or have had negative experiences with previously held bank accounts. As part of the *Bank On* initiative, trusted community partners, such as government agencies and non-profit organizations encourage account opening and provide access to financial education. In relation to the sustainability of basic accounts, the perception of being a low-income product with limited functionality might adversely affect customer acceptance. Moreover, regulatory requirements limiting the end user price may not be sufficient for service providers to cover their expenses, which can jeopardize the financial sustainability of the offering, leading either to market-withdrawal or lack of market support.

Davivienda, a Colombian Bank used a “subtraction” method in order to design an affordable product to appeal to low-income households. In this design method, all cost-intensive procedures and features

were removed or replaced, allowing the service provider to offer a low cost service, while still keeping the basic features of a bank account. The aim was to offer a low-cost or free product based on a “self-service” model in which the customer does not require physical contact in branches or personalized assistance, and can easily understand the service options through a simple user-friendly interface. The resulting product was DaviPlata, the first mobile wallet in Colombia (Marulanda Consultores, 2015).

### 3.2. Product features

The adoption of a retail payment instrument by consumers, businesses and governments is also influenced by how the instrument is perceived in terms of risk, liquidity, cost, acceptance, and convenience (World Bank, 2012a). The possibilities afforded by new information and communication technology allow service providers to offer value-added features, which might not have been possible in previous years. Innovations that can impact on usage of digital payment mechanisms are set out below.

#### [Simplifying and speeding up account opening and use can improve customer experience and promote broader usage.](#)

GSMA (2015) reports 299 million registered mobile money accounts and 33.3 million unregistered customers globally at the end of 2014. The latter transact exclusively over-the-counter (OTC) with mobile money agents, due to a lack of a transaction accounts. Both numbers (registered mobile money accounts and unregistered users) grew at nearly the same rate in 2014. In some cases, service providers have invested heavily to migrate their OTC customer base to registered users. OTC usage is particularly common in Pakistan, where five of the six mobile money services reported more than one million unregistered users in 2014 (GSMA, 2015).

In Kenya, identification cards are a key barrier to account opening, especially for women: 35% of Kenyan women (compared to 18% of men) interested in trying mobile financial services cited a lack of identification as their main reason for not opening an account, despite the fact that 85% of women (and 87% of men) surveyed actually owned an identification card. Therefore, on this basis, there would appear to be a need to streamline the registration process (BFA, 2013).

Many mobile money providers have responded by automating and digitizing account opening procedures through mobile applications and tools. Some financial institutions, like Equity Bank, KCB and CIC Insurance Group in Kenya, have developed electronic document collection tools in-house. Some financial service providers have started adopting tiered Know-Your-Customer (KYC) procedures, recognizing that low income individuals making low value transactions and holding low balances present low risks. For example, beneficiaries of social transfers in Pakistan benefit from simplified KYC processes, while in Colombia, remote paperless account opening for low-value accounts is allowed. In Malawi, an ID card issued by a non-governmental organization to program beneficiaries is accepted for KYC purposes (Almazan, 2013). ICICI Bank of India launched an application that enables account registration by using the information from a customer’s Facebook profile (Tyler, 2015). Nationwide Microbank in Papua New Guinea accepts letters from village leaders as sufficient identification to open a mobile money account. Also, Telesom ZAAD in Somaliland accepts letters of reference, certain employer IDs and voter IDs (in addition to government issued IDs) to register customers for an account (Frydrych and Aschim, 2014). These types of flexibility in terms of identity documentation can help

simplify the customer registration procedure, boosting usage of formal financial services and thereby increasing financial inclusion. However, they are rather intermediary solutions and cannot replace a national (electronic) ID database. Furthermore, any simplified or tiered structure of requirements for KYC would need to be assessed as consistent with FATF principles and guidance, national risk assessments can be critical in that regard. FATF, after revising some of the key aspects of its Recommendations in 2012, issued guidance in February 2013 on the application of these standards in the context of financial inclusion efforts. Under the revised FATF Recommendations, should a country be able to identify lower-risk scenarios or products (a prepaid low-value product, a basic account with strict deposit/withdrawal thresholds etc.), the country may allow simplified CDD processes for those situations.

### Providing new options to access funds can lead to higher use of financial services and digital payments.

In Sub-Saharan Africa, a survey conducted in 11 countries found that more than 80 percent of bill payments and remittances are still made in cash, resulting in substantial inefficiencies (Kendall et al., 2014). This trend has been in part attributed to a lack of appropriate digital payment mechanisms, with the result that consumers, businesses and governments have little alternative but to bear the costs of cash transacting (Klapper, 2014).

In 2014 the Government of India took significant steps to facilitate financial inclusion by launching the Indian Prime Minister's People's Wealth Scheme. Accounts issued under the scheme provide free insurance for early adopters of the account, and (after six months) overdraft facilities aimed at reducing account dormancy. 188.6 million new bank accounts were opened in India by mid-October 2015, about 38.49% of those held zero balances. One reason for the low account usage might be the lack of debit or ATM cards issued, so it may be too time-consuming or inconvenient to carry out transactions. Therefore, these account owners are increasingly issued RuPay cards, suggesting that card ownership can boost account usage (Demirguc-Kunt et al., 2015; The Global Findex Database, 2014; Kumar and Radcliffe, 2015; PMJDY, 2015).

Digicel's TchoTcho mobile money service in Haiti can only be used by customers to withdraw and deposit money at TchoTcho Mobile's agents and limited partner locations, rather than using it to make digital payments. This is similar to the cash card that is offered as part of the Philippines 4Ps cash transfer program, which can only be used to withdraw funds at certain bank branches and ATMs (Zimmerman et al., 2014). Safaricom Kenya is seeking to expand its mobile money service into a broader platform by encouraging small businesses to accept M-Pesa payments and, by doing so, adding additional options to access and make use of the funds (GSMA, 2015).

Several mobile money operators, mainly in large Latin American markets, offer "companion" cards. These are usually Visa or MasterCard-branded debit or pre-paid cards that allow mobile money account holders to use the money stored on their mobile account at any location where the branded cards are accepted. Although this trend is recent and there is little evidence on its effectiveness, it indicates that payment service providers are willing to offer an access channel that consumers are familiar with (Almazán and Frydrych, 2015).

### Payment services can serve as a gateway to a broader range of financial services

The use of innovative digital payment mechanisms can result in data being available on the basis of which customized products can be designed and targeted to relevant consumers and/or market segments. For example a supply chain payment made electronically rather than in cash, or mobile phone charges can be a valuable source for providers to make credit decisions or offer saving products.

Some service providers, such as Alipay and PayPal, started as simple online payments platforms before offering broader financial products like credit lines, savings, escrow, and insurance to increase revenue per users (Jain et al., 2014). According to GSMA (2015), many mobile money operators in Africa have also increased their financial product base by offering existing customers access to savings, micro-credits, and international remittance services. M-Shwari, launched in 2012 by Safaricom and Commercial Bank of Africa, is a mobile credit and savings service, with 3.6m active customers as of March 2014. M-Pawa in Tanzania enables its customers to use an existing M-Pesa mobile money account to hold savings and earn interest on them, and eventually have access to micro loans. Millicom's Tigo partnered with the mobile micro insurance intermediary Bima in multiple markets, including Ghana, Tanzania and Senegal, to offer loyalty and fee-based life insurance to its customers and their family members when they register for the mobile service and spend a certain amount of money on Tigo's mobile network. While most of the current deployments are offered by the respective payment service provider (alone or in partnership with other service providers) to extend their product range, some of them also offer application programming interfaces (APIs) that enable third parties to develop innovative financial services products utilizing the existing user base of services, like Dwolla, PayPal or M-Pesa, that offer APIs.

### Providing additional products and services can incentivize account holders to use their accounts

Among mobile money transactions, merchant payments are increasing, reflecting rising interest among mobile money providers in facilitating customers' daily expenditures of goods and services. However only 25.4% of the 258,000 merchants registered to use mobile money are currently active, indicating that mobile money providers need to take steps to increase use of mobile money services for merchant payments (GSMA, 2015). Allowing account-holders to receive mobile money in an account enables customers to make and receive P2P transfers, topping up airtime, paying bills, or paying directly for goods and services at merchant stores (Murphy, 2014).

In the Philippines, Smart offers a service called BayaLoad, attached to its mobile wallet which is used for government payments. Launched in July 2013, BayadLoad also allows users to make contributions to the national health insurance program (PhilHealth). The program is also being utilized by the Philippines national housing agency. Bayaload was designed to serve two target markets: i) informal domestic workers and ii) formal sector employees who must subscribe for and pay for government social benefits, such as health insurance, under the new Kasambahay Law (Shrader, 2013).

Another example relates to payments for agricultural products. Various financial service providers in Africa have partnered with large produce buyers to help them make payments to farmers using mobile money. These services have also enabled farmers to repay micro-loans with mobile money, thus reducing both the need for cash and lengthy travel times previously required to make cash repayments.

The produce buyers KAITE in Zimbabwe, as well as Agribusiness Systems International and GADCO in Ghana, have initiated pilots to pay farmers with EcoCash and Tigo Cash, respectively. SmartMoney in Tanzania and Zoono in Zambia have also facilitated mobile payments between suppliers and farmers, resulting in lower payment costs and improved security (Parada and Bull, 2014). Zoono, which works mainly in the agricultural sector in Zambia and Malawi, offers farmers a choice between transferring mobile money into their mobile wallet (if they have one) or receiving an electronic voucher (Pénicaud and Katakam, 2014).

Pay-as-you-go or lease-to-own options for purchasing essential goods and services, such as technology and equipment that provides sustainable access to clean water and energy, can offer added value too. Typically, customers make a down payment on the equipment and pay the balance in small installments using mobile money. For example, M-KOPA in Kenya, Mobisol in Tanzania and PEG energy in Ghana provides a digital payment option and financing for various types of solar home systems. Grundfos Lifelink in Kenya and Sarvajal in India provides a digital payment option for turnkey water solutions at prices starting at USD 0.001 per liter of purified water in Kenya and USD 0.003 per liter in India (Parada and Bull, 2014).

### 3.3. Business model

The pricing of payment services and products plays an essential role in their uptake and contribution to greater financial inclusion. Although payment services and products may be available to customers, they may be unaffordable. Since the unserved and underserved typically have low incomes, greater financial inclusion will be difficult to achieve without viable pricing models, although these models also need to be commercially viable from the provider's perspective.

Technological innovations have reduced the costs of providing payment services and products significantly. However, only around 10% of the products in the Global Payment Systems Survey 2010 were reported to have no fees. About 80% of the products had a per-transaction fee, with instances of multiple fees usually relating to products offered using a collaborative model with multiple entities (World Bank, 2012b). Innovations relating to business models that have the capacity to drive greater usage of digital payment mechanisms are set out below.

**Enabling more customers to transact with each other, and enabling businesses to accept various types of payments online and in-store, can increase adoption.**

Card use in Africa has been limited, prompting MasterCard and Visa to develop new mobile money-based products and adapt existing products and practices, particularly with the aim of increasing interoperability to develop a larger customer base. Visa has established the interoperable mobile money system mVisa in Rwanda, and the mobile wallet-linked prepaid card Visa Mobile Payments in Botswana. In Egypt, MasterCard has launched the interoperable mobile money application Phone Cash that can be linked to a MasterCard credit card. In Nigeria it has its branding on the national e-ID cards and has equipped them with payment capability (Parada and Bull, 2014).

Any closed loop payment service significantly limits the potential use and convenience of the service. According to a survey by AFI (2015), this restriction applies particularly to Ghana, Guinea, and Zambia, and partially to Egypt and Senegal. However, there seems to be a general trend in Africa towards interoperability between e-money accounts of different providers and between e-money accounts

and bank accounts. The Democratic Republic of Congo, Kenya, Liberia, Nigeria, Madagascar, Rwanda, Tanzania, Uganda, the West African Economic Monetary Union (WAEMU), and Zimbabwe have active interoperable services between e-money accounts and/or between e-money and bank accounts (AFI, 2015).

In addition, “aggregators” have started offering payment and agent services to customers of all MNOs. Maxcom has aggregated mobile money services in Tanzania and Rwanda, also providing over-the-counter payments to government and utility companies. Selcom in Tanzania also provides cash-out and bill payment services to customers of mobile money providers, as well as banks. Payment aggregators also help businesses accept mobile money and card payments online through multiple gateways. They allow customers to make multiple routine payments (for example, for school tuition or utility bills) or shop for goods on a single website. At the same time, businesses receive all payments, regardless of how they were initiated, into a single account. One of the most popular gateways operating in several countries in East Africa is Pesapal, which charges consumers in East Africa a small percentage of the transaction amount and merchants about 3.5% of the transaction value (Parada and Bull, 2014).

### Mobile money providers can increase usage by steering and incentivizing customers to use the most cost-efficient payment mechanisms.

Mobile money has been mainly used by consumers for P2P payments resulting in the need for multiple cash-in/cash-out transactions, through a large agent network. Various mobile money providers consider that their services can become more efficient if customers can directly pay with mobile money in-store. In addition, merchants using mobile money often have access to additional analytics capabilities, operating efficiencies, better security, and reduced fraud. Safaricom in Kenya, along with two other companies, partnered with Kopo Kopo to offer mobile money payment options for merchants at the point of sale. Merchants who registered for the service were given a SIM card, which allows mobile phones to work as a POS device. All mobile money payments are aggregated into a single account and a summary of daily sales is prepared, reducing the back office costs for the merchant. Kopo Kopo charged merchants a flat rate fee of 1% of transaction value. MNOs, including Safaricom in Kenya, Telesom in Somaliland, and Econet in Zimbabwe, have also started to acquire merchants directly, as they see merchant payments as critical for the success of their business strategies (Parada and Bull, 2014).

## 3.4. Financial capability

Improving consumers’ financial capabilities is a key strategy for bringing underserved and unserved people into formal financial systems (Parada and Bull, 2014). An important way to improve financial capability is through financial education. Digital payment innovations may struggle to succeed in the absence of strategies to educate intended customers on their uses and benefits and broader financial capabilities<sup>14</sup>. For instance, research has shown that in Kenya, Pakistan, Papua New Guinea, and Tanzania a significant number of men and women who are aware of mobile financial services have not

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<sup>14</sup> Financial capability is the internal capacity to act in one's best financial interest, given socioeconomic environmental conditions. It therefore encompasses the knowledge, attitudes, skills, and behaviors of consumers with regard to managing their resources and understanding, selecting, and making use of financial services that fit their needs (Source: World Bank Group, <http://responsiblefinance.worldbank.org/publications/financial-capability>).

tried them. In Papua New Guinea, 47% of women and 35% of men who wanted to create a mobile transaction account have indicated that their main reason for not creating one is their lack of understanding of how to use it. Except in Pakistan, many of the surveyed non-users wanted to try mobile financial services, offering providers an opportunity to attract the underserved and unserved as new customers (BFA, 2013).

In particular those at the bottom of the pyramid lack experience with usage of financial services and technology and may thus feel pressure to transact without full knowledge and adequate time to learn. A recent World Bank Group Financial Capability Survey on the Philippines shows that mobile financial services, like other financial services, are used disproportionately by the wealthy (World Bank, 2015e). Research conducted by the Grameen Foundation revealed a large gender gap in knowledge and use of mobile phones and mobile financial services in India. Indian women were more generally reluctant to use mobile financial services on their own, compared to men, due to a lack of confidence or due to low levels of literacy and numeracy. Men were more likely to confidently conduct transactions on their own, while women would often rely on an agent or a male family member, even after they had been trained to use the services (Grameen Foundation, 2013).

#### Online resources can effectively educate customers if they can be easily accessed.

A promising way to increase consumers' understanding of and trust in digital payment mechanisms is to promote learning by doing. Interactive games and mobile applications can thereby be powerful outreach channels. Although most of these apps and games have been developed for markets where computers and smartphones are more readily available, a few examples exist of financial education apps on feature phones. For instance, harnessing the power of habit formation and behavioral design, the mobile phone based personal finance tool, Juntos Finanzas, motivates its users to build savings in small amounts on a regular basis. Launched in February 2015 in Colombia with Tigo, the “Su Dinero” (Your Money) financial education program provides local financial education lessons through basic mobile devices. Tigo customers can use the service as part of Internet.org with zero data charges. The service extends financial education to 7 million Colombians who wouldn't otherwise have access to it. It works on low-cost smartphones and feature phones so that mobile users with basic handsets can still access the service (DAI, 2015).

#### Use of mass media, and edutainment in particular, can be an effective channel in delivering financial education to adults.

Recent research has shown that conveying financial messages through innovative ways such as using popular TV soap operas, films, videos or radio programs can be quite effective in bringing underserved and unserved people into formal financial systems. Edutainment programs are presumed to be particularly effective if messages are delivered in an engaging and entertaining manner through appealing stories that stick to memories. (World Bank, 2014b). For instance, in Kenya, a soap opera with more than six million viewers, ‘Makutano Junction’, incorporated financial education messages into some of its stories. Other examples of the use of entertainment education for finance are ‘Scandal!’ in South Africa or ‘Mucho Corazon’ in Mexico. As with other soap operas, people watch these edutainment dramas because they identify with the characters and enjoy the stories; but in the course of watching the shows, they benefit from the financial capability enhancing messages and ultimately change their behaviors. At the same time some research findings indicate a possible short-lived impact of these interventions if they are not repeated and reinforced over time (Di Maro et al. 2014).

### Customized information directly addresses the needs of unserved and underserved customers.

Tailored communication content for the underserved and unserved, along with customized marketing campaigns are important customer education tools, since underserved and unserved groups often lack access to mass media or time and resources to consume it. In many countries, women have the double burden of paid work as well as and unpaid domestic work, and tend to consume less news than men. Mass media campaigns, therefore, are more likely to reach the financially included and/or men. However, various innovations relating to customer education are now being implemented with a view to overcoming knowledge barriers that prevent greater usage of digital payment mechanisms, as set out below (BFA, 2013).

An example of customized information directly addressing the needs of unserved and underserved consumers is the World Bank Group's Project Greenback 2.0 that aims to increase transparency and efficiency in the market for remittances by for migrants and their families in their home locations. Based on research on migrant communities Project Greenback 2.0 activities are implemented, which include: financial education focused on remittance services; supporting projects of migrant associations in order to promote information, awareness, education and implementation of best practices on remittance behavior; and facilitating and keeping an active dialogue between migrant citizens and market players, and encouraging the latter to develop new services or approaches that are better suited to migrants' needs (World Bank, 2015b).

## 4. Access & Delivery Channel Innovations

A precondition for increasing usage of digital payment services and products is ensuring they are broadly and conveniently accessible to users. From a payer's perspective, even if payment services and products are otherwise attractive, they are of little use if rarely accepted or difficult to access. From a payee's perspective, accepting new methods of payment has to be easy, safe, reliable and cost-efficient. This section will discuss innovations relating to the point of interaction, the payment device, the technology to transmit payment-related data, and finally the way payments are authorized.

### 4.1. Contact points

The physical proximity of users to service providers is widely considered a key factor in financial inclusion. Based on Findex 2014 data, distance was the second most important demand-side factor cited by adults to explain not having an account at a financial institution, trailing only high costs of opening and holding an account (Demirguc-Kunt *et al*, 2015). Next to brick and mortar branches of commercial banks, post offices and savings banks, have an extensive branch network in a lot of countries and play an important role in financial inclusion (Anson *et al.*, 2013; WSBI, 2015).

Countries with an advanced banking and payment system typically have a well-developed and sufficiently dense network of contact points in place. The number of ATMs per 1 million inhabitants in these countries was usually between 500 and 1,500 (World Bank Global Payments System Survey 2012). However, with the increasing substitution of cash by electronic payments, the trend in these countries is towards fewer contact points due to substitution of brick-and-mortar branches and ATMs by alternative distribution channels, e.g. mobile and online banking.

In low-income countries a strong correlation between the quality of foundational infrastructure (such as electricity supply and ICT infrastructure) and the density of contact points can be observed. The network of contact points (branches and ATMs) in urban and/or touristic areas is often well developed, while rural areas are frequently underserved.

With regard to physical access channels (ATMs, fixed and mobile POS terminal, bank and non-bank agents, and bank and MFI branches), available information provides only a broad indication of the reach of networks. For example, a frequently reported statistic is the number of branches or ATMs per 100,000 adults or 1 million inhabitants. Aggregate figures on this metric provide some indication of the ATM penetration across countries. For example, the figure in many Sub-Saharan African countries is well below 100 per 1 million inhabitants. However, these aggregate figures do not reveal the distribution of those contact points within a country, nor how many different locations are serviced by those ATMs.

Innovative payment services and business models offer ways to reduce geographic barriers without greatly expanding branch networks, but this relies heavily on the quality and reach of the nation's communication and IT networks. Unfortunately, low network coverage (for both internet and mobile phones) often coincides with a low density of physical service provider outlets. Current innovations that seek to overcome various barriers related to access points are set out below.

The agent-banking model can be a viable, cost-efficient alternative to increasing the number of bricks and mortar branches.

Many countries in Latin America and the Caribbean, South-East Asia, and Africa are enabling some traditional branch and ATM-based services to be provided at small neighborhood shops, outlets of large retailers, supermarkets, pharmacies, and other stores that have in place an agent banking agreement with a bank. From a financial services provider's perspective, these networks can reduce the costs of providing accounts to low-income customers, reducing per-transaction costs from USD 1.00 to as low as USD 0.30 (Burgess, 2014; Armijo et al., 2013).

The most prominent example of expanding distribution channels through the network of agent banking outlets is Brazil. In addition to providing financial services in previously unserved communities, agent banking outlets also offer greater convenience for users in areas that also have bank branches. The development of the current model began in the late 1990s, and its ongoing improvement is a permanent part of the Brazilian Central Bank's agenda. The number of agents in the country rose from 19,000 in 2000 to 150,000 in 2010 and reached almost 340,000 in 2015. Mainly due to the effectiveness of agent banking, today all of Brazil's 5,565 municipalities have at least one access point, and financial inclusion generally has increased as a result. The proportion of municipalities with more than five access points per 10,000 adults rose from just 18% in 2000 to 94% in 2010. Over the last five years, the number of people with an active relationship with a financial institution has increased by 31% to 121 million, which is 84% of Brazil's adult population (BCB, 2012; BCB, 2015).

In both Brazil and Colombia, payments are the most commonly used service. These include payments of utilities, taxes, and other public fees, and transfers between individuals (AFI, 2012). A recent survey of 2,885 Brazilians asking about their access to financial services and use of agents found that 67% of Brazilian households pay at least one bill through an agent. While the survey found that the overall proportion of Brazilians using agents to access financial services is low, those who are using these services through agents typically have lower incomes, have more limited education, are more likely to be women, and are more likely to live in small towns and rural areas, suggesting that agents are improving financial inclusion by reaching underserved populations (Sanford and Cojocarú, 2013).

Other countries in Latin America have followed suit, including Mexico (2009), Peru (2005), Colombia (2006), Ecuador (2008), Venezuela (2009), Argentina (2010), and Bolivia (2006) (AFI, 2012). Agent banking is increasing prominence in Asia. In 2011, the People's Bank of China launched agent banking pilots with large state-owned banks that have built networks of over 500,000 merchant agents. (Shrader and Duflos, 2014). Other countries around the world have also utilized the agent banking model to expand financial services, including Pakistan, the Philippines, Kenya, South Africa, Uganda, and India. In order for agent banking to succeed, regulators and policy makers may need to pay close attention to the costs of complying with agent banking regulations, so that these costs do not exceed the benefits for payment service providers of using agent banking as a growth or outreach strategy (Faz and Moser, 2013).

**Financial cooperatives can complement branch networks of banks and MFIs.**

The Central Bank of Brazil has also focused considerable efforts on strengthening financial cooperatives, which play an important role in serving specific sectors, particularly rural credit and producers' associations. Significant improvements were made to the regulatory framework for this

sector in the 1990s and 2000s, resulting in a better-structured cooperative system. Between 2000 and 2010, the number of cooperative service points increased from 2,600 to 6,400, and the number of cooperative members rose from 1.5 to 5.1 million. In 2012, credit cooperatives were present in 40% of Brazil's municipalities and in 25% of municipalities without a bank branch. The combined effect of these efforts is supporting progress towards financial inclusion in these sectors (BCB, 2012).

#### An efficient cash logistic process can support a more extensive network of contact points.

Efficient cash logistics can be challenging for agents, especially in rural areas without access to bank branches and with large distances between agent locations. Zoono is one of Zambia's mobile money providers with high agent activity rates which has reduced the need for frequent float rebalancing by extending electronic credit to its agents. Rural agents especially valued this option. Some mobile money providers may not be willing to take on the risks of extending credit-line to agents, and may therefore be more likely to explore alternative means of rebalancing for their rural area agents (Frydrych and Aschim, 2014). A national survey of 2,028 agents in Uganda found that an agent loses a median of three transactions per day due to lack of float (Githachuri et al., 2014).

Instances of inadequate cash logistic processes are also instructive. The government of Haiti used to use mobile money for a large-scale distribution program using Digicel's agent network. However, the network was not as strong as expected and it was unable to manage the volume of payments required. Subsequently, a separate remittance operator Unitransfer was engaged to deliver cash payments where mobile money transfers could not be made efficiently, resulting in large losses to the program.

In Kenya, the World Food Program found the agent network was not strong enough to process payments, so it chose to provide recipients with a bank account and a debit card instead of using mobile money (Zimmerman et al., 2014). According to Gilman et al. (2013) for operators to convince customers to switch to mobile money, they need to demonstrate that the cash-in/cash-out experience at mobile money agents is significantly better than local alternatives.

## 4.2. Access devices

Access device innovations can make payments more convenient for payers. The most commonly used access device, the payment card, has seen ongoing innovation over the past decades: from plastic cards with embossed cardholder credentials, to magnetic stripe cards with data, to smart cards with integrated circuit chips, to cards with contactless technology and/or multipurpose functionality (e.g. ID, generation of authorization credentials). At least equally relevant to the ongoing technological improvement of payment cards, was the standardization of payment cards, protocols, and acceptance devices. This section focuses on access devices beyond cards, both relating to devices in the possession of the customer, as well as acceptance devices of payees and service providers.

The importance of mobile phones and other mobile devices as payment devices has grown significantly, although it should be noted that this trend impacts disproportionately on women in many countries. Women in low and middle-income countries are 21% less likely to own phones than men. 34% of women in Tanzania, 13% of women in Kenya and 10% of women in Papua New Guinea who would like to try mobile financial services cite the lack of a phone as the main reason for not having done so (BFA, 2013).

The ways that people use mobile devices also differs markedly and has an impact on digital payment uptake. According to Global Findex, about a third of adults in developing countries had access to the internet in 2014, however, only 10% of those used it to make payments. At the same time, about 16% of adults globally used their phone to access an account and make a transaction.

Table 1: Access to feature phone vs. smart phone in selected markets (MasterCard, 2014)

	Egypt	India	Indonesia	Nigeria	Philippines	Vietnam
<b>Feature phone</b>	69%	86%	75%	85%	87%	83%
<b>Smartphone</b>	17%	11%	65%	32%	25%	64%
<b>Laptop</b>	7%	3%	38%	5%	30%	62%
<b>Personal Computer</b>	13%	3%	34%	0%	31%	53%
<b>Tablet</b>	2%	1%	29%	2%	31%	49%

Despite these challenges, the rapid evolution of lower-cost technology, particularly smart phones, is helping support a range of access point innovations that have the capacity to increase digital payments update. Noteworthy innovations are set out below.

#### Low cost smart phones can provide access to digital payments and improve their efficiency.

Since 2008 smartphone prices have fallen 30% in Asia, 25% in Latin America and 20% in Africa. The increasing number of smartphone models priced under USD 100 is the main driver of consumer migration from basic and feature phones to smartphones. Prices between USD 25-50 may lead to near-ubiquitous smartphones in developing countries too. Low-cost smartphones and broader (sometimes free) data access is creating more competition in the mobile money applications market. In turn, different interfaces and service features are becoming available, allowing different customer segments to be targeted. For example, smartphones allow for easy integration of IVR interfaces, which can be well suited to markets with low literacy levels. Well-designed apps can also create better user experience, thus attract more active customers (GSMA, 2014).

In 2014, Mozilla announced a USD 25 smartphone design using its Firefox operating system. Also in 2014, a number of smartphones priced between USD 25-50 were introduced in developing markets, with new models becoming available from several handset manufacturers (Zhang, 2015). In addition, smartphone providers are increasingly moving into the payments space: smartphone manufacturer Xiaomi offers a mobile wallet that can earn interest. Apple launched Apple Pay; Google launched its own mobile wallet Android Pay and is planning to add a P2P feature to it; and Samsung acquired Loop Pay and is currently testing its own Samsung Pay payments service in South Korea (Tyler, 2015).

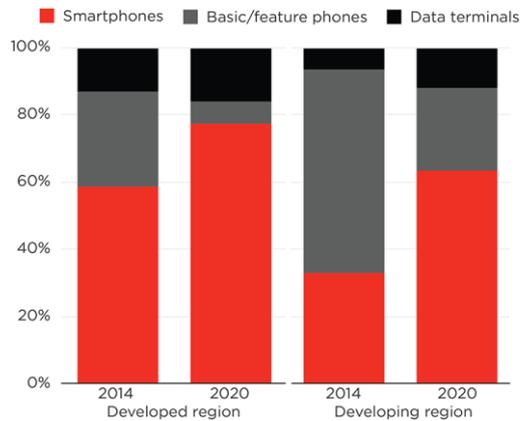


Figure 1: % of regional total connections (excluding M2M), Source: GSMA Intelligence

Mobile point-of-sale (mPOS) devices can enable small retailers to use their mobile phones as POS-terminals, and offer a viable alternative to cash payments.

Numerous companies have developed mPOS devices that attach to smartphones. The global mPOS installed base is expected to grow from 13.3 million units today to 54.0 million units in 2019, with most of this growth taking place in emerging markets (Rolfe, 2015). An inexpensive dongle is usually attached to a smartphone's audio jack, which has an application to assist in the payment process. While providers like Square, PayPal or iZettle are amongst the most prominent, traditional stakeholders like terminal manufacturers, card schemes, and banks have also joined the mPOS trend and expanded their activities in this area.

mPOS has in the meantime become a platform for small merchants to professionalize and manage not only their payments processes, but often their supply chain and customer interactions as well. In developed countries, mPOS devices are supporting the trend of "pop-up stores" (temporary sale outlets), since they do not require a fixed installation and/or bulky equipment. Similarly, mPOS are offering a viable solution for small retailers in developing countries who often operate from very small or non-permanent locations.

MasterCard partnered with African Ecobank Group to distribute mPOS terminals to retailers in selected African countries. This is a part of MasterCard's partnership with Ecobank to issue credit, debit and prepaid cards to customers across 30 markets in sub-Saharan Africa in the next 10 years, which could also facilitate international remittances. South Africa's Emerge Mobile has launched its mPOS device in several African markets; Nomanini has sold 750 terminals across Africa since 2013. In Vietnam, MasterCard has partnered with Sacombank to equip small merchants at the Ben Thanh market with mPOS terminals. Over 300 mPOS terminals have been deployed at the market, allowing traders to accept card payments for the first time. The State Bank of India engaged Ezetap to roll out 500,000 mPOS terminals within five years.

Payment kiosks and other self-service devices can provide a bridging technology between brick-and-mortar branches (or agent locations) and an entirely digital payment environment.

Payment kiosks are especially prevalent in Russia, Eastern Europe and Central Asia where they started to appear around a decade ago. In Russia alone, 250,000 payment kiosks were in use in 2012 (Dostov; 2013). However, payment kiosks are increasing in number in China, India, Malaysia, Jordan, Brazil, Argentina, Chile, Peru, Colombia, Panama, and even in rural parts of the United States. They are often effective in remote rural areas and among migrant laborers for international remittances in urban areas like Mumbai, Delhi, or Bangalore (Kravtsov, 2013; Owens, 2015; PPI, 2014). Payment kiosks are frequently used in connection with prepaid cards, which can often be topped up at these kiosks by paying in cash. Initially large payment network operators offered the payment kiosks to third parties for sale or lease, but over the past year a number of banks have bought out third party operators. One of the reasons for the interest of banks in payment kiosks are their lower investment and maintenance costs compared to traditional ATMs. Payment kiosks sell at USD 2,000-3,000 (compared to ATMs: USD 12,000-25,000) and have on average lower annual maintenance costs of around USD 1,000 (compared to ATMs: USD 3,000) (Kravtsov, 2013).

### 4.3. Data Transmission

Innovation in data transmission can improve security and reliability. It is also relevant to the interaction between payer and payee, between payment service providers and the payment systems they are using, and between the payment service provider and its customers. With innovations in data transmission, payment initiation has become faster, allowing people to pay by waving their payment card in front of a POS-terminal (contactless card payments). Further, modern information and telecommunication technology allows payment data to be exchanged remotely, e.g. via the internet and/or mobile phones.

Innovations in relation to messaging that may impact uptake of digital payments and financial inclusion are set out below.

**Mobile internet appears to quickly surpass existing messaging systems, can improve the security of transmissions and has better functionality.**

The most commonly used messaging system for mobile money at present is called Unstructured Supplementary Service Data (USSD), with large deployments that rely primarily on USSD including bKash in Bangladesh, WING in Cambodia, EasyPaisa in Pakistan, ZAAD in Somaliland, M-PESA and Tigo Pesa in Tanzania, and EcoCash in Zimbabwe. Advantages of USSD are that it can be used on any cell phone and does not require changes to the SIM card or a replacement thereof. However, using USSD is MNO-dependent, which means that a mobile money operator can only offer its services to customers of MNOs with whom it has formal service agreements. Non-MNOs have been complaining in the past that MNOs could deny certain providers access to USSD, offer access but at a high price and/or the access is provided, but with poor quality. While ideally market participants can agree on fair access to the USSD channel on their own and/or by moral suasion of the respective regulators (i.e. financial, telecommunication and competition regulator), dispute resolution mechanisms or even regulatory intervention have been considered necessary in certain markets (Hanouch and Chen, 2015).

An alternative to USSD is a messaging system called “SIM Toolkit” (STK). This system uses a phone’s SIM card to initiate actions that can be used for mobile payments. It is not as cost-efficient as USSD, but is generally regarded more secure and user-friendly.

However, likely to overtake both systems is mobile internet, which is more secure, has better functionality and is more user-friendly. The drawback of mobile internet is that it requires customers to have internet-enabled phones as well as reliable internet access, which is often problematic in low-income countries.

Due to the high potential of internet in financial services, multiple initiatives to provide free data access have emerged: Brazilian bank, Bradesco, together with MNOs, has offered free mobile internet banking; and Mozilla and the MNO Orange offer free data access in some African and Middle Eastern countries. This trend could contribute to greater financial inclusion when coupled with reduced prices of smart phones and SIM cards discussed in this paper (Tyler, 2015).

#### 4.4. Authentication and authorization

The process of authenticating payers and authorizing payments entails activities to verify the identity of the parties involved in the transaction, validate the payment instrument used, verify that sufficient funds are available, and communicate information required to complete the payment and the payment processing.

Recent innovations in the field have aimed to speed up the verification of a payer’s identity for both in-person and remote payments. Low levels of literacy in some markets have made finding an appropriate yet secure authentication process difficult. This section will discuss national identification infrastructure issues as well as the use of biometric innovations for authentication and authorization purposes, and its potential to increase financial inclusion.

##### National identification infrastructure can be leveraged to authenticate users.

A lack of national identification infrastructure, as discussed in this paper, has been in some instances a challenge for creating mobile money accounts, which are frequently governed by Know-Your-Customer regulations. This challenge has been particularly acute in relation to customers living in some rural areas. As a result, proof of identity requirements can be a substantial barrier to greater financial inclusion. Recognizing this, various governments, including those of Nigeria and India, have taken steps to create national unique identification databases and new forms of identification. Recognizing the importance of authentication to payments specifically, solutions that integrate payment capabilities into ID cards have been developed, such as in the case of Nigeria’s e-ID card. (Jain et al., 2014).

##### Biometric innovations can play a role in markets with low levels of literacy and numeracy, and can make authentication and authorization more secure and efficient.

In China, retailer Alibaba is offering a smartphone mobile wallet application that uses facial recognition for authentication purposes, allowing customers to pay without a PIN or password (Tyler, 2015). Voice recognition is another biometric authentication technique being used by financial institutions. Nuance, VoiceTrust, InAuth, and VoicePay are among the vendors offering solutions in

this area. UBL Bank in Pakistan is planning to offer its customers voice recognition options using IVR authentication in Urdu and English, allowing for authentication of customers with low levels of literacy by reducing the need for PINs, passwords, and security questions (Parada and Bull, 2015).

The government of India initiated a campaign aiming to uniquely identify Indian citizens through their fingerprints, and in turn assign each person a unique identification number. The cost of enrollment is low, and the need to invest in smart cards and rely on local databases is eliminated. This identification system enables agents throughout the country to offer financial services to people on low and very low incomes, as well as to distribute government payments. (Banerjee, 2015).

Tangaza Pesa, a money transfer service in Kenya, uses fingerprint authentication for registering and authenticating customers. Many new smartphones have biometric fingerprint scanners to unlock the device and authenticate phone-initiated payments (Parada and Bull, 2015).

Eyeverify in the USA and Africa uses a phone camera to take an image of the blood vessels in the whites of the eye as a method for authentication, which the company claims is simple and highly accurate, and cost-efficient.

Cardless ATMs using various biometric authentication approaches are also being developed. Chase in the USA is developing an ATM that uses a palm reader for authentication. Itautec in Brazil has developed ATMs, which authenticate customers through facial recognition (CGAP, 2015). Compared to regular ATMs and POS terminals, those leveraging biometric authentication are still more expensive, making their economic sustainability more challenging and impeding their rollout on a larger scale to date.

## 5. Outlook: Scalability, Replicability and Sustainability

To assess the capacity of various innovations to contribute to greater financial inclusion in the future, it is imperative to assess: the capacity to scale up payment innovations and leverage their benefits for larger volumes of payments; the potential to replicate innovations in different contexts; and the potential of those innovations to build on sustainable business models.

Large volume use cases like government collections and disbursements can contribute to a critical mass of digital payment usage, beyond which scalability and sustainability become much more achievable. Government payments cover a wide range of economic sectors and activities, and in most cases the overall amount of payments is significant (World Bank, 2012d).

USAID and Citibank have identified ten “accelerators” to increase mobile money usage that are to a large extent consistent with the findings of this report. These accelerators include: the safety and transparency of mobile money services; the extension of acceptance networks; customer education; efficient customer identification; effective pilot programs to test properly innovations; and interoperability (USAID, 2012).

The potential for scalability, replicability, and sustainability of a number of innovations has already been a factor in the development of the following innovations:

- The Government of Colombia engaged DaviPlata to make conditional cash transfers to the 937,000 beneficiaries of the Más Familias en Acción social benefits program. The proceeds from the contract allowed DaviPlata to fund the expansion of its agent network and ATM infrastructure. (Marulanda Consultores, 2015).
- Since 2011, United Bank Limited (UBL) in Pakistan has reached nearly 1.3 million families by delivering a large portion of the Benazir Income Support Program’s (BISP) social benefits through its Omniplatform. UBL has also partnered with the government and various NGOs to deliver flood relief subsidies and cash payments for work programs.
- Plan International was an early adopter of e-payments in Uganda. In 2012 it used cash to reimburse participants for transportation costs. Plan reports that when it switched to a mobile money bulk payment product, it saved 77% of the costs of these payments, saved participants time by eliminating the need to wait in line for cash disbursements, and increased staff productivity by reducing paperwork and freeing up time for staff to deliver training. Plan also reports that it increased its transparency and reduced the security risks of cash handling (USAID, 2014).
- In Italy, the central government launched the Carta Acquisti social card program in 2008 to provide special benefits to families with small children and to senior citizens. It has become one of the largest government payment programs in Europe both in terms of scale and outreach, with over 500,000 recipients in its first two months of operation. The Italian government chose prepaid cards to deliver these benefits so as to control how funds were used (funds are intended to buy food only), and because prepaid cards allow for rapid deployment to a large number of people in a short time (World Bank, 2012d).
- E-Commerce platforms, Alibaba being a very prominent example, have resulted in payment product innovations and increased use of digital payments. Alipay, founded in December 2004, has in the meantime 400 million active customers worldwide and it works together with more than 200 financial institutions and provides payment options for nearly ten million small

and micro enterprises. Based on data from iResearch, Alipay is the largest third-party online payment option in China, in terms of total payment volume (Ecommerce News, 2015).

Governments in many developing countries are set to accelerate their investments promoting electronic payments in the period ahead. This trend, combined with changes in payment laws and regulations, should be a significant driver of greater financial inclusion. Commitments by several countries to adopt electronic payments should drive financial inclusion in markets such as Bangladesh, India, Indonesia, the Philippines, Nigeria, Brazil, Mexico, Russia, China, Malaysia, Thailand, Afghanistan, Kenya, Malawi, Rwanda, Ghana, Senegal, Peru, Colombia, Ecuador and Uruguay (Owens, 2015).

The World Economic Forum's (WEF) Global Financial Inclusion Initiative (established in 2013) and the Global Partnership for Financial Inclusion (GPI) Markets and Payment Systems sub-group are together conducting a stocktaking exercise to further analyze the scalability, replicability and sustainability of innovations using the framework identified in this document. The World Bank Group (as an implementing partner of both initiatives), in cooperation with the Better than Cash Alliance, CGAP and Alliance for Financial Inclusion, is leading this survey. This stocktaking exercise focuses on large volume use cases, including government payments, day-to-day payments by customers to sole traders and small and medium-sized merchants, and merchants' payment to their suppliers. The findings of the stocktaking exercise, together with the findings and structural approach of this report, will inform the upcoming GPI publication on government payments, i.e. the deliverable B of the Markets and Payment Systems sub-group current work plan.

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