The Viability of Mass Market Digital Finance in the Pacific

This publication is brought to you by the Pacific Financial Inclusion Programme, which is jointly administered by the United Nations Capital Development Fund (UNCDF) and United Nations Development Programme (UNDP), and receives funding from the Australian Government, the European Union and the New Zealand Government.

January 2021

This research was conducted and written by Ulana Insight's Financial Technology Advisor Mike McCaffrey, with contributions from Naomi de Groot, Knowledge Management Specialist and Bram Peters, Regional Digital Lead at UNCDF in the Pacific. For this piece UNCDF spoke to many organizations, including some of our trusted partners. We would like to acknowledge their contributions; their time and their open and honest conversations.

FOREWORD

More than a decade ago the UNCDF and UNDP in the Pacific set out to increase the access to and usage of formal financial services for Pacific Islanders. An immense task given the challenges that make the distribution of goods and services so difficult across the vast Pacific Ocean scattered with thousands of islands. How do companies such as Unilever and Coca-Cola ensure that you can buy a bar of soap and a soft drink no matter how remote you are? And so how do we work together with banks and mobile network operators to ensure that you can check the balance on your bank account and receive money in these remote islands sent by your family member in town?

Mobile money platforms and agency banking networks intend to do exactly that; deliver services outside of branches in urban centers. Throughout the years, we have collaborated with financial service providers, to provide advice and work to de-risk the roll-out of their operations into places with limited customers or market segments that we as a development partner prioritise, such as in agricultural communities, or focused on women and migrants.

Through those efforts over more than two million Pacific Islanders have gained access to financial services, women representing almost half of these people at the height of our efforts. However, over time, some solutions did not prove sustainable from a business perspective and were therefore scaled down, or even closed altogether.

To fully understand the specific challenges to increase access and usage of digital finance in the Pacific, we analyzed some of our data and spoke with various experts and stakeholders involved throughout the years to get a better picture why scaling some of these solutions proved to be too hard in the Pacific, whereas the same solutions have managed to gain ground in other parts of the world.

This research will allow us to learn from our work throughout the years as we move ahead and continue to find ways to meaningfully introduce innovative digital financial services to Pacific Islanders. We are excited about the opportunities ahead.

Bram Peters

UNCDF Digital Lead in the Pacific

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Executive Summary

The UNCDF Pacific Financial Inclusion Programme has had significant success extending access to formal financial services in the Pacific. However, some of the high-profile projects focused on the distribution of digital financial services it has supported have had difficulty maintaining scale and many have ceased operations altogether. Therefore, it is important to understand the lessons from these experiences, especially when designing an array of new projects by UNCDF in the Pacific in the years ahead.

For this research 20 experts in mobile money and agent banking were interviewed to gather hypotheses on the drivers of these difficulties in the Pacific region. These hypotheses were analyzed against global datasets on financial inclusion in the developing world to determine if these challenges were unique to the Pacific and if there was precedence for overcoming them. The findings are presented systematically, beginning with a demand analysis for financial services, then reviewing the total addressable market (TAM) in PICs and the business cases for serving them.

The findings show that attempts to extend access to finance to the mass market through mobile money and agent banking generally fail to scale profitably. The difficulty of making these models work in the best conditions should be well understood by all stakeholders attempting to implement them in the Pacific. In the Pacific, although there is significant demand for financial services, the relatively small dispersed populations, mostly living in rural areas make it especially difficult to serve them profitably.

This is because initial investment costs take longer to recuperate when there are fewer users. Further, mobile money and agent banking have significant operational costs as they rely on the expensive task of moving cash securely across geographies. These costs commonly exceed the revenues generated in rural areas with little economic activity, which are common in the Pacific. Therefore, large portions of the Pacific probably cannot be served without continuous support from development partners and the public sector.

However, there are important country variations. Papua New Guinea (PNG) does have market conditions conducive to mass market finance like mobile money or agent banking, but overall has lacked providers willing to make the necessary financial commitments to scale and extend the services to the last mile. Fiji has had relative success compared to the other PICs and is ready to focus on more advanced digital services and deepening partnerships. Samoa and Tonga have exceptional inflows of international remittances, which may provide the high margins needed to anchor a new service provider. Solomon

Islands and Vanuatu are the most challenging geographies and successful mass market finance in either country is unprecedented in other alike jurisdictions. They will have to pioneer unique pathways, which will likely need significant support from development partners and the public sector for several years.

Future progress in the Pacific will be difficult and will require long-term financial commitments, patience, and expert creativity to efficiently solve problems. Product suites will need to garner higher usage per customer than what is observed globally, and distribution networks will need to be more efficient than those designed by the leading providers globally. Most PICs likely have markets too small to support competing providers, so regulators will have to ensure customers are protected while being careful not to damage the business case for serving them. Financial service providers will need to specialize and make complimentary partnerships and governments will need to do what they can to support these systems by using them to distribute and receive payments. UNCDF in the Pacific remains committed to continue providing the technical assistance and financial support to its partners to build financially sustainable businesses impacting users in the Pacific, including those living at the last-mile.

Introduction

Over the past decade there have been many laudable efforts dedicated to improving financial inclusion in the South Pacific. In the countries where the UNCDF Pacific Financial Inclusion Programme (PFIP) operates, the rates of adults using formal financial services has grown precipitously since the original estimates in 2007, and in more than one country has more than doubled. Respective central banks have crafted national strategies and progressive policies, banks and telecoms have invested time and money developing new products and distribution networks and PFIP has coordinated and supported much of this work.

However, progress has not been linear or without difficulty. Few of the high-profile advances of the past have stood the test of time. The evaluation of PFIP II at the end of 2019, notes that while at the peak of the programme PFIP succeeded in enrolling 1.2 million people in formal financial services, that fell to 779,633 by the end of the project period.[1] This decline was driven by discontinued and downscaled projects from various PFIP partners. Refer to Appendix 1 for a list of examples.

These trials over the past years have led to speculation over the viability of mobile money, agent banking and other digital finance services in the South Pacific. While it is common across the developing world for services to have difficulty with sustainability, all leading financial service providers and telecoms have struggled with this in the Pacific. Therefore, the challenges in the Pacific may be uniquely acute.

However, there is not a clear consensus on the most prominent challenges or the extent of their ability to limit the provision of mass market financial services. Hypotheses on the most influential driving forces fall into four related categories:

a. Cultural issues which depress demand for financial services.

b. Demographics and geographies of the small island nations which limit the total addressable market.

c. Business models for mobile money and agent banking not being viable.

d. Financial institutions using suboptimal strategies and operational tactics.

This research investigates the first three prominent categories.[2] It compares hypotheses gathered from 20 expert interviews to global data sets to guide the discussion on future progress. A systematic analysis is done beginning with a review of the demand research to understand if there is some unique limiting factor for financial services in the Pacific. The conclusion is that PICs actually have average or above average levels of demand for key anchor products like savings, credit and remittances. However, most people are still relying on informal financial solutions.

Given there is significant demand for the most common services that have been used to build mobile money and agent banking systems, the research investigates the total addressable markets (TAM) that could be captured by a private sector entity. The study clearly shows that there are lower numbers of adults and especially urban adults in some PICs than have been present in any other country that has successfully scaled a mobile money system. At the same time intriguing analogs are identified where mobile money has scaled in some small populations located in Eswatini, and Somaliland.

[1] https://erc.undp.org/evaluation/evaluations/detail/9950

[2] Some comments are made on the last category, however, there is a general lack of data on it, and evaluating it must be done given an understanding of the importance of the preceding categories (e.g. one cannot evaluate a strategy for a service of delivery channel without first understanding the demand for it).

The discussion of the business models for mobile money and agent banking explains that the past difficulties are quite common. Globally there is an extremely low success rate for building financially viable mobile money operations, so it should not be surprising that there have been challenges in Pacific Island Countries (PIC)s. Further, there is little known about the financial viability of agent banking models, especially those that are designed to appeal to mass market customers. However, an analysis of the leading retail banks in Kenya shows that expanding the customer base has not led to improved profitability.

The small, difficult to address markets in PICs mean that these business models will be extremely difficult to make viable in most PICs. Financial services may need to attract more usage than they do in other countries and distribution networks will need to be exceptionally efficient. These tasks will require high-level guidance from leading professionals in places like East Africa and even then, it is likely that these services will not be offered profitably in rural and remote areas of PICs.

It is a hopeful time to reflect on the past experiences in the PICs as there is a new wave of activity across the region, which should be guided by the lessons learned from this previous work. Vodafone reports having initial success in Fiji with its QR code payment solution for merchants. Digicel, Vodafone and other mobile operators are currently investing in expanding mobile money services to Vanuatu, Samoa, Solomon Islands and Tonga. Banks like BSP and ANZ are actively looking to redesign their digital strategies and are now ready to embrace a partnership approach to market development. Further, e-ticketing on the public transport systems in Fiji and a pilot using airtime to make deposits into the Solomon Islands National Provident Fund (SINPF) are showing promise.

The Demand for Financial Services

Demand surveys provide great initial insight into the current usage and need for different types of financial services and allow benchmarking across geographies. Unfortunately, the World Bank Findex survey does not cover the Pacific Islands, so the only demand side survey data available for PICs are the national surveys done between 2014-2016 in Fiji, Samoa, Tonga, Solomon Islands and Vanuatu.[3] While it is not ideal that the data is a few years out of date, it is sufficient indicator for the purpose of this research. This data allows a comparison of PIC data to a global cohort of countries at similar income levels, and clearly shows that the Pacific people actively use both formal and informal financial tools in line with countries in their income-level brackets.

Formal Finance Account Penetration

Three of the focal countries (Fiji, Samoa, Tonga) are classified as upper middle-income countries by the World Bank and three countries (PNG, Vanuatu, Solomon Islands) are classified as lower middle-income countries. When we compare the percentage of adults that have formal financial services accounts in these Pacific countries to their respective income-level benchmark, it shows that Pacific countries are reasonably close to their benchmarks.

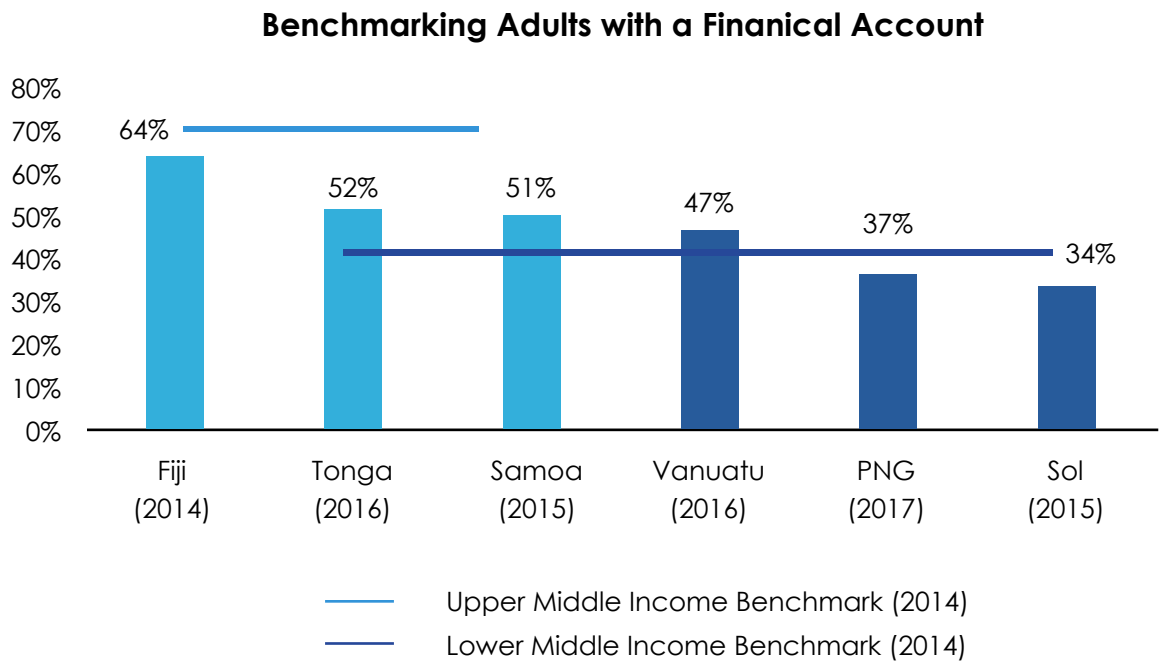
For upper middle-income countries, the benchmark is that 72% of adults have a formal financial service account. Fiji is closest to that benchmark, and at first glance, Samoa and Tonga are significantly below it. However, it makes sense given that the respective GNI per capita in these latter two countries was just above the minimum bound needed to be included in the upper middle-income category at the time the surveys were taken. For the lower middle-income cohort, Vanuatu ranks above the bracket benchmark, which was 42% in 2014. Both PNG and Solomon Islands rank slightly below it but are reasonably close to it.

PICs are all within a reasonable distance of their global income-level benchmarks for formal financial account registration. However, it is also imperative to understand what challenges have limited further population penetration, given that in all countries (except Fiji) only approximately 50% or less of adults are registered for formal financial accounts. Therefore, it is important to understand why many adults remain outside the formal financial system. It could be they do not have a need for financial services or that there are supply side issues preventing the design and delivery of those services formally.

Delving deeper into the survey data reveals that for the two most common banking products – savings and loans – there is significant demand for both of them across the surveyed countries, and just a very small usage of formal finance to meet those needs. This points to supply side issues being the problem. Further, there is a significant demand for remittances in PICs. The story with remittances is more complicated as there are money transfer operators and postal services already serving segments of the market. Therefore, while there is demand, new service providers will have to displace experienced incumbants and no precedence for this could be found globally.

[3]http://www.pfip.org/our-work/work-streams/market-information/national-demand-side-surveys/

Figure1: Benchmarking Formal Account Registration



Savings Behaviour

Analyzing the percentage of adults that saved in the last year (formally or informally) and the percentage of adults that saved in a financial institution shows three important trends.

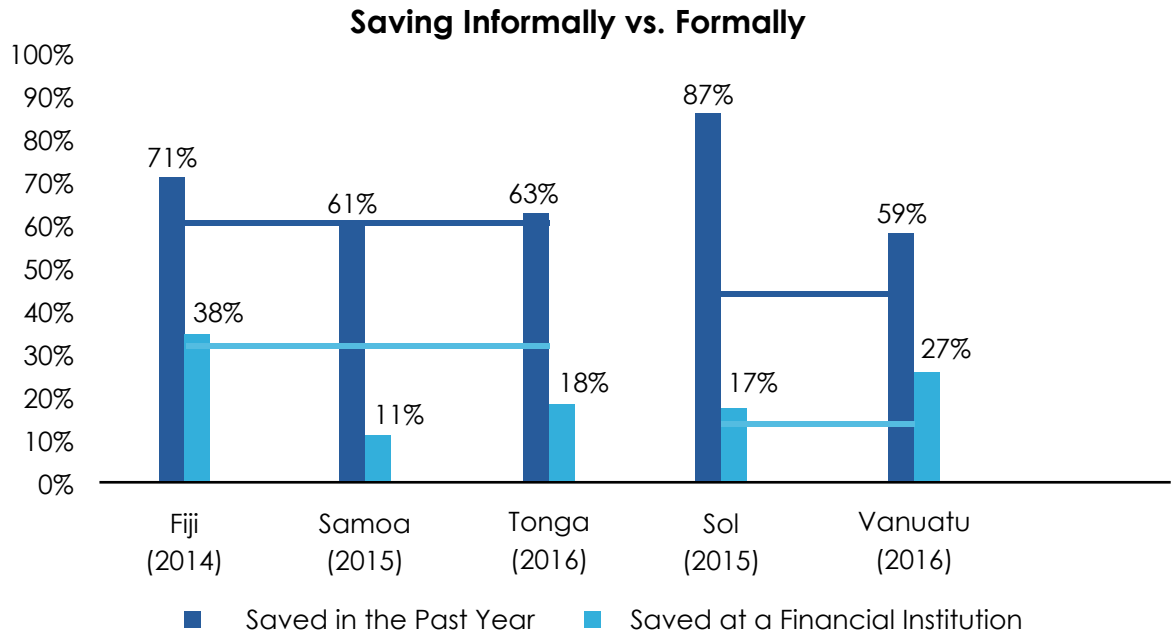
The first is that across the survey countries in the Pacific, the percentage of adults that have saved in the past year is at or above the benchmark for their World Bank income-level cohort (shown as a green line for the two respective classifications). This is clear evidence against the commonly held beliefs that Pacific Islanders do not understand the importance of saving or have cultural practices that make it too difficult.

The second important trend is that the percentage of adults that are using formal financial institutions to save is small in relation to the percentage of adults that are saving overall. This trend holds across Pacific countries and tells us that most savings is being done informally. In summary, while percentage of adults that save in the Pacific is high, it is seldomly done through formal financial systems.

The third insight is that the respective income bracket benchmarks are also low (shown by the blue horizonal lines), showing that it is common across countries with similar levels of GNI per capita for half or more of those that save to do so outside the formal system. In upper middle-income countries, while 61% of adults have saved, only 31% did so formally, and for lower middle-income countries, 45% of adults saved in the past year, but only 14% did so in a financial institution. This means supply side issues are commonplace across countries with similar income-levels.

There is some variation in the Pacific Islands with regards to their respective benchmarks. In Fiji, Vanuatu and Solomon Islands, the use of formal finance for savings exceeds their respective benchmark. However, Samoa and Tonga show significantly lower use of formal finance for savings relative to their benchmarks. Further research should analyze this differential to see if there are significant differences in the financial service offerings in Samoa and Tonga, especially in relation to Fiji where usage is much higher.

Figure 2: Savings Behaviour in the Pacific Islands

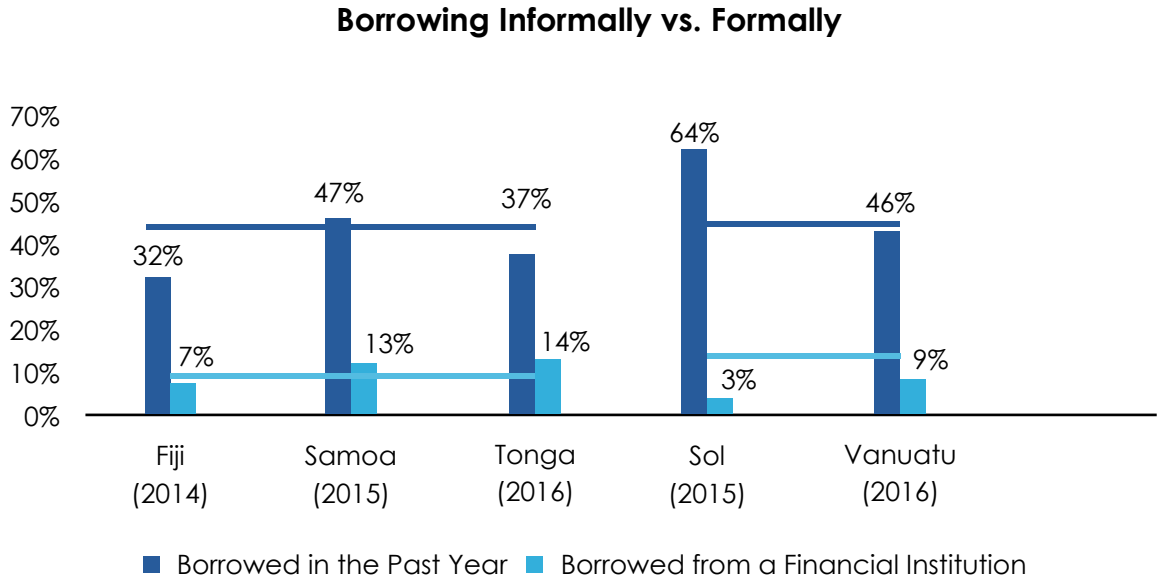


Borrowing Behaviour

Conducting the same analysis with borrowing behaviour some of the same trends are present but there is more variation in the data between Pacific countries. The percentage of adults that borrowed in the past year in Solomon Islands is significantly higher than its respective income-level benchmark (49% shown by the green line on the right-hand side). Adults in Vanuatu and Samoa borrowed in similar levels to their income level benchmarks, and in Fiji and Tonga, adults borrowed significantly less in the past year than adults in countries of similar income levels. This data points to an average or above average demand for borrowing in the former three countries and a lower demand in the latter two. Given the similarity in cultures between Tonga and Samoa, this is surprising. It cannot be explained through this data and further research should be done to investigate what drives this differential.

Overall, as we saw with savings, the percentage of those that borrow from financial institutions is a small proportion of those that borrow generally (including through informal mechanisms). This is the general trend for countries with similar income levels as shown by horizonal blue lines which represent the respective income level benchmarks. In this analysis, Fiji and Solomon Islands stand out as having significantly lower percentages of adults that use formal institutions for borrowing relative to both their respective benchmarks and to the other Pacific Island countries. This insight also deserves further research into differences in financial service offerings in these countries relative to those where formal finance is being used at higher rates.

Figure 3: Borrowing Behaviour in the Pacific Islands



Remittance Behaviour

Analyzing demand survey data for remittances shows that the five Pacific countries surveyed all have remarkably high percentages of adults that receive remittances relative to benchmarks of countries with similar income-levels (shown as horizonal lines). The benchmarks are not perfect as they only measure the percentage of adults that receive domestic remittances, whereas the data from the Pacific is for both domestic and international remittances.

The World Bank Findex does not collect data on international remittances. This makes sense in the context of the 2011 Gallup Poll across 135 countries which found that only 3% of adults live in households that receive remittances, and there are only 35 countries in the world where 10% or more of adults receive international remittances (either as money or in-kind).[4]

Both the upper middle-income country benchmark and the lower middle-income country benchmark were 18% in 2014 and given the Gallup findings we can reasonably assume that it would not be much higher even if recipients of international remittances were added. All five countries rank above this benchmark showing that the demand for remittance services is robust in these countries. However, the nature of that demand varies importantly by country. While the vast majority of remittances Solomon Islands and Vanuatu are domestic, the exact opposite is true in Samoa and Tonga, with Fiji showing significant demand for both international and domestic remittances.

[4]https://news.gallup.com/poll/147446/Three-Percent-Worldwide-International-Remittances.aspx

Figure 4: Remittance Behaviour in the Pacific Islands

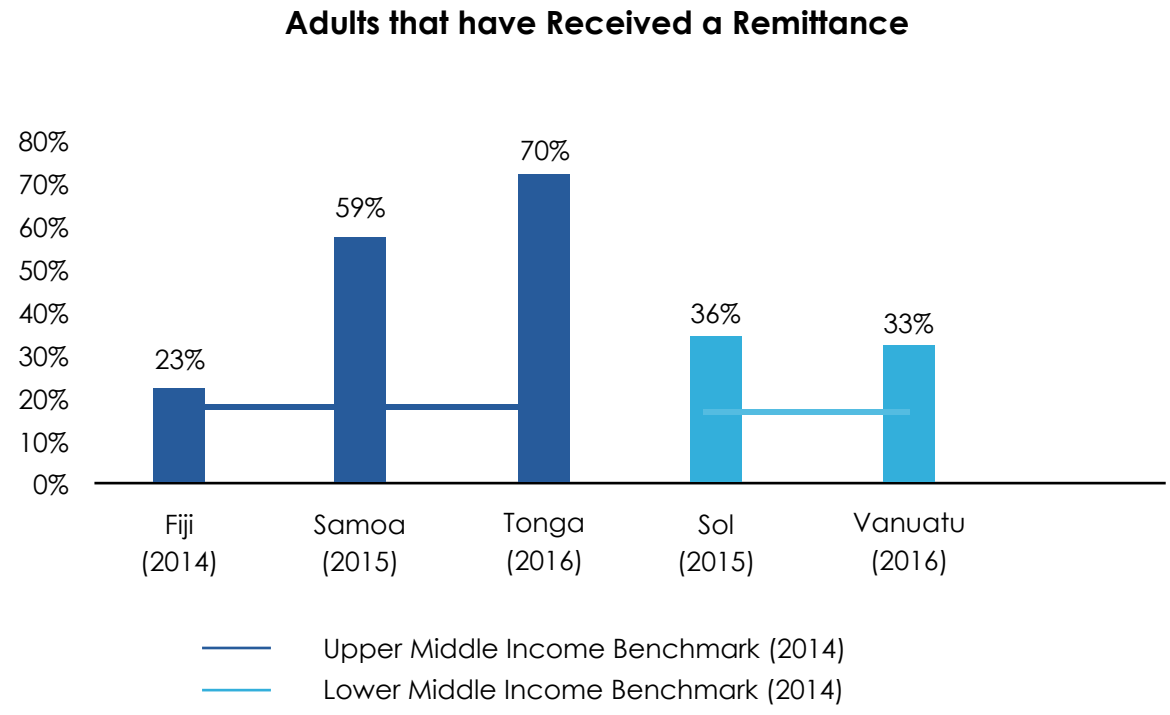
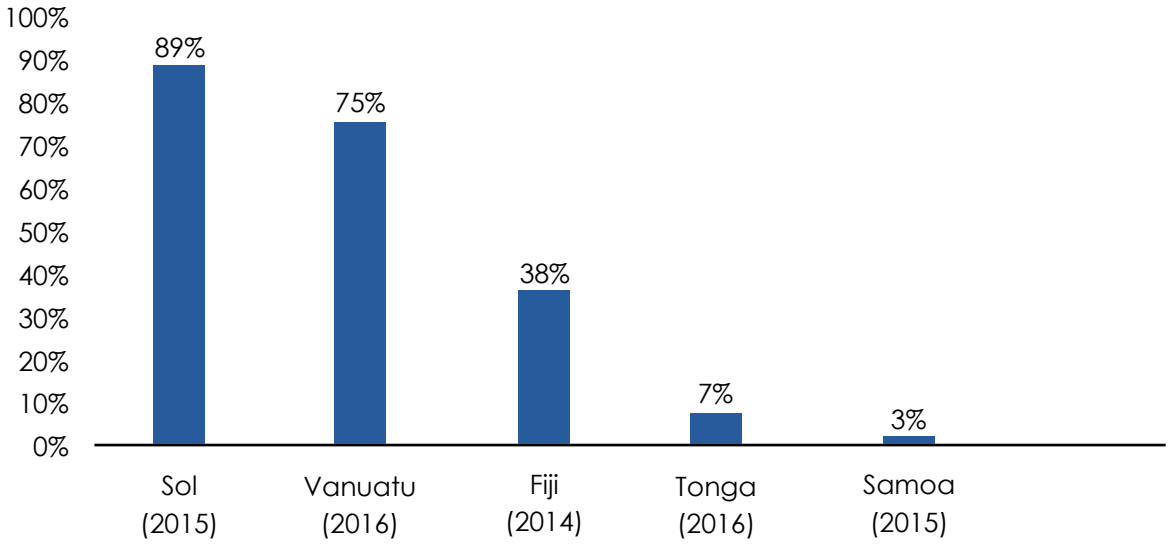


Figure 5: Domestic Remittances in the Pacific Islands



Western Union is a dominant method for receiving international remittances in the three countries where they are popular (Samoa 91%; Tonga 83%; Fiji 72%). In Vanuatu, Western Union is also used to receive 55% of domestic remittances. A further 21% are sent through a friend or relative. In Fiji, 43% of domestic remittances were received through the post office and 31% were received through a friend or relative. In Solomon Islands, 68% of remittances were received through a friend or family member. The use of bank accounts for receiving remittances is low across PICs and mobile money was not mentioned as a reception method in the demand surveys for any PIC country.

Therefore, there is a significant demand for remittance services across these Pacific countries. Much of it, especially the international component of it is being served by Western Union, which may be difficult for new service providers to displace even if they can offer lower prices. However, domestic remittances are still highly likely to be done informally through friends and family in the three countries where they are popular and present a clear opportunity for mass market finance.

Other Financial Services

Depending on the purpose of the analysis, other financial products could be analyzed here as well. However, for banking services, savings and loans are really the key value propositions to analyze. In some cases, retail payments may also be important, but we can just safely assume everyone makes retail payments (i.e. demands them) at least for basic goods and services, and that cash is used for the vast majority of purchases as is the case across the developing world.

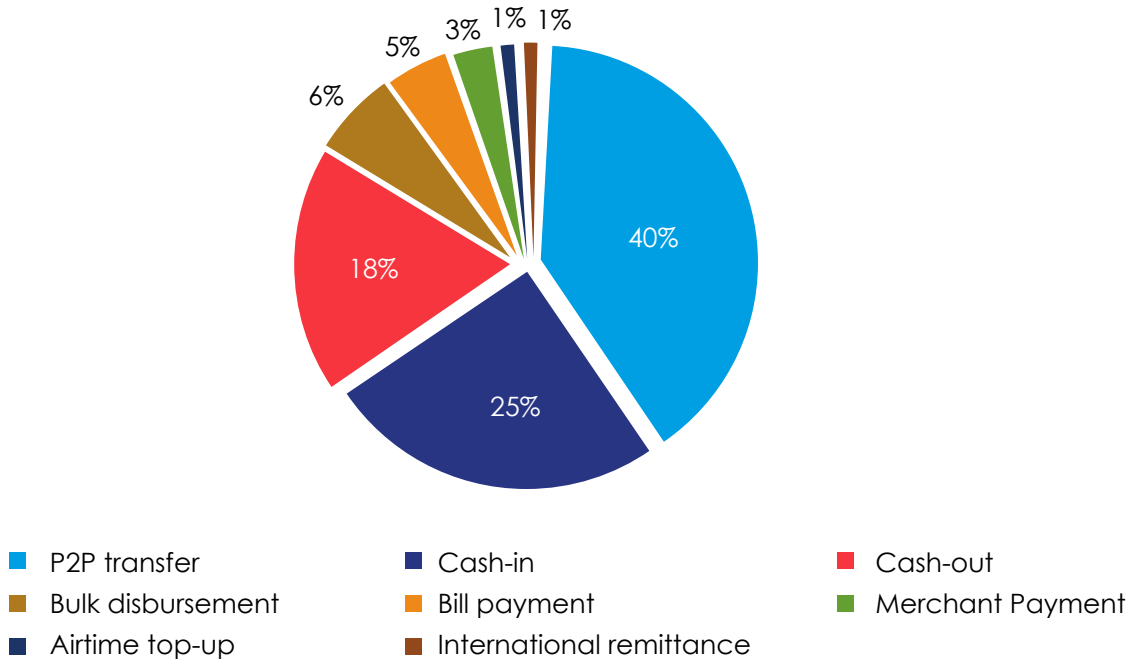
For mobile money, there is a misperception that there is a myriad of popular use cases. However, analyzing the GSMA transaction data from December 2019 shows that 83% of transactions by value are either P2P or cashing money in or out of the system. In some cases, it makes sense to evaluate bulk payments, but given they only account for 6% of global transactions, they are generally not an important driver of viability. Further, analyzing transactions by volume shows that airtime purchases and bill pay are significant, but the small average value of these transactions means they are not important on the value dimension.

Globally, there are only a few examples of mobile money services that have scaled with products other than domestic P2P transfers. One is ZAAD in Somaliland, which is the only known service to scale with merchant payments as the anchor product. Otherwise, it is believed that international remittances played a key role in Lesotho,[5] and GSMA reports they will soon launch a case study reporting the same for a provider in Malaysia. While Latin America is commonly cited as counterexample given they have a disproportionately large ratio of bulk disbursements to total payments (13% in December 2019), this was not true during the first three years of industry growth, when P2P transactions where the dominant anchor product.[6]

[5]Expert Interview with Master Agent in Lesotho.
[6]https://www.gsma.com/mobilefordevelopment/resources/2016-mobile-money-latin-america-caribbean/

In summary, this section on demand shows that there are only three value propositions that commonly serve as anchor products for mass market finance, savings, credit and remittances. For all three, demand in the Pacific is generally either inline or well above their income-level country benchmarks. However, most of that demand is not being served by formal financial services,[7] which is common in other countries of similar income-levels. Therefore, capturing this remaining portion of the market that remains informal will require expertise in the design and delivery of financial services that provide customers with a significantly better experience than the informal solutions they currently use. In the following sections the analysis focuses on the size of the market and the business case for investing in extending formal finance to these potential customers.

Figure 6: Mobile Money Transactions by Value (December 2019)



[7]Money transfer operators (MTOs) are generally not included in financial inclusion statistics as they generally do not require the receiver to have an account, and therefore not account-based services.

The Total Addressable Market (TAM)

Understanding that there is demand for core financial services like savings, credit and remittances is the first step to designing formal services for the mass market and subsequently a distribution strategy to reach it. While the demand data shows that a large portion of the population of each Pacific country actively saves, borrows, and receives money, that does not mean that there is a viable business case for serving that demand.

The next step in this analysis looks at the challenges surrounding the total addressable market (TAM) in each of these countries. There are several hypotheses in the Pacific regarding how small populations, low population densities and/or rural and remote communities might limit the viability of providing formal finance in these countries. While this paper considers business cases for both mobile money and agent banking to extend formal finance, given there is very limited information available on the usage of agent banking and a significant amount of information available on mobile money, this section focuses on mobile money. Agent banking is discussed in the following section.

Is the TAM too Small?

As discussed in the following section, the popular business model for mobile money is based on high volumes of transactions. Individual users only tend to make a few transactions per month using mobile money, which means a large number of people need to be registered to make the service financially viable. Hence, it is generally considered more difficult to make mobile money systems viable in countries with small populations like the Pacific. One of the easiest ways to evaluate this assumption is to research the population sizes of countries where mobile money systems have significant population penetration.

In 2017, after a decade of industry development, there were 90 countries with mobile money services,[8] however, the 2017 World Bank Findex revealed that there were only 24 countries where at least 20% of adults were registered for a mobile money service. This means that in 73% of countries with mobile money systems, 80% or more of the adults are not using mobile money. This is important because it highlights how difficult the service has been to scale in the variety of countries around the world where it has been attempted.

Reviewing the population sizes of the 24 countries with the highest mobile money population penetrations, it is surprising to note that nine of them (38%) have populations of ten million people or less. This list includes six countries with populations under five million people. Further, Findex 2017 does not provide statistics on at least two other important small population examples.

Once the figures from Eswatini[9] and Somaliland[10] are included in the list, they rank first and second in the world in terms of the population penetration of mobile money, and join Kenya and Uganda as the only two places in the world where 50% or more of adults are registered for mobile money.[11] This is strong evidence that mobile money can thrive in areas with small populations.

[8]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/05/GSMA_2017_State_of_the_Industry_Report_on_Mobile_Money_Full_Report.pdf
[9]https://finmark.org.za/system/documents/files/000/000/184/original/ME_Report.18.pdf?1601965010
[10]https://www.gsma.com/mobilefordevelopment/resources/telesom-zaad-pushing-the-mobile-money-cva-frontier/
[11]Somaliland has declared itself as an autonomous state and is therefore not generally included in country rankings such as these. However, the purpose of this analysis is to look purely at population sizes regardless of the jurisdictional status and therefore includes Somaliland.

Figure 7: Locations with Populations less than Five Million and High Mobile Money Penetration

Country/Region	Population (M)	Mobile Money Peneration (registered adults)
Eswatini*	1.1	79%
Somaliland*	3.5	78%
Gabon	2.1	44%
Namibia	2.4	43%
Lesotho	2.1	28%
Botswana	2.3	24%
Mongolia	3.2	22%
Liberia	4.8	21%

*Note: All population figures are from UNDP HDR, mobile money penetration figures are from Findex 2017, except for Eswatini and Somaliland which were found published elsewhere (cited in text).

Extending the analysis further to measure the relationship between population size and mobile money penetration in countries that have achieved high rates of mobile money population penetration, it is clear that population size is only very weakly correlated to mobile money penetration (See Appendix 2 for the analysis). However, this conclusion needs three important qualifications:

1. Given there are nine known countries with smaller populations than PNG, which have mobile money penetration rates of 20% or higher, the population size of PNG is large enough to support a mobile money operation. However, there are no examples of countries with populations as small as the Fiji Islands (pop. 900,000)[12], Solomon Islands (pop. 700,000), Vanuatu (pop. 300,000), Samoa (pop. 200,000), or Tonga (pop. 100,000) that have shown success. Therefore, the analysis of global data still leaves the question open as to if these countries have large enough populations for a viable mobile money operation. In essence, there may be a minimum viable population level that is greater than these population figures and success in such small countries would be unprecedented.
2. These figures use population penetration as a proxy for success, however, they do not necessarily convey financial viability. This means that providers in these countries could be providing mobile money services at a loss. This is discussed more in the section on business models.
3. Population size is only the beginning of a sound analysis. It is important to further investigate the demographics and distribution of that population. The next section begins to investigate these more complex interactions.

[12]PFIP is working with M-PAISA Fiji to compile statistics on their registration and activity rates, which may reveal that they have at least a 20% penetration rate. However, further research is still needed.

Population Demographics and Distribution

Beyond the total population size of a country it is important to understand the number of adults in the population that would qualify for a financial account, their levels of income and how they are distributed over the geography of the country. These analyses provide a more accurate understanding regarding the comparability of other small country experiences to PICs. This section focuses on income levels, population densities and the share of the population in rural areas as those are commonly cited barriers to viability in the Pacific.

For this analysis, an expanded country list is used to incorporate more data. The 40 known countries[13] with a mobile money penetration among adults of 10% or more is used to measure correlations between mobile money penetration and the above-mentioned variables. This provides insight on the importance of these variables in relation to scaling mobile money in each country.

Further, a secondary analysis is presented which investigates more specifically the importance of these variables in other small countries with high mobile money penetration rates.[14] This provides more granular insight into how these factors affect countries with similar population dynamics to PICs and enables us to gauge if there is a precedence for success or if PICs would have to pioneer pathways forward in the sector. For example, in the last analysis of population size, while the finding was that population size and mobile money penetration are actually not strongly correlated, the secondary analysis of countries with small populations also showed that there is no global precedent for high levels of mobile money penetration in geographies as small as many of the PICs. Both insights are important. Listed below are the headline findings from the variables analyzed and more details are provided in the three tables in Appendix 3 including the governing hypotheses that underly the importance of testing these variables.

1. **The percentage of the population that is rural:** While rural populations are more difficult to serve, higher percentages of rural populations in countries are surprisingly positively correlated to mobile money penetration. However, all PICs (except for Fiji) are equal to or have higher percentages of rural adults than the comparative cohort of small successful countries, meaning scaling mobile money in these countries would be unprecedented for such small and rural populations.

2. **Population Density:** Low population densities make viable distribution strategies difficult, however, there is surprisingly no meaningful correlation between population density and mobile money penetration in leading countries. Further, three of the five small comparative countries have significantly lower densities than PICs, meaning that on average population density should not be an issue for PICs.

3. **GNI per capita:** Low incomes might mean there may not be enough economic activity to support financial services. However, there is actually a weak negative correlation between mobile money penetration and GNI per capita, meaning that lower income countries are more likely to have a higher mobile money penetration. For PICs PNG has a GNI per capita similar to the lowest small comparative country and Vanuatu and Solomon Islands have significantly lower GNI per capita than any comparative country, meaning scaling mobile money in these countries would be unprecedented for such small and low-income populations.

[13]39 of these countries are from FINDEX 2017. Eswatini is added for the analysis, but Somaliland is not given the difficulty of collecting demographic data on the population and geography.
[14]The five known countries with mobile money penetration rates of 20% or more and populations of 2.5 million or less people were selected as benchmarks. These countries are: Eswatini, Lesotho, Gabon, Botswana, and Namibia.

4. **Country income level classification:** The concern is that low-income countries will not have enough infrastructure to support mobile money and high-income countries will have such developed financial infrastructure that mobile money will not be a compelling service for customers. While it is true that mobile money penetration is extremely rare in high income countries, the analysis shows it is also rare in upper-middle income, middle income and lower-middle income countries where average mobile money penetration ranged from 3% to 5% of adults in 2017.[15]

   Low-income countries have an adult population penetration rate of 18%. Essentially, countries with income levels above the low-income bracket very rarely scale their mobile money systems. However, all PICs and the small successful country cohort are either upper-middle income or lower-middle income, so while these income levels are less likely to be successfully globally, for small countries there is significant precedence of scaling mobile money under these conditions.

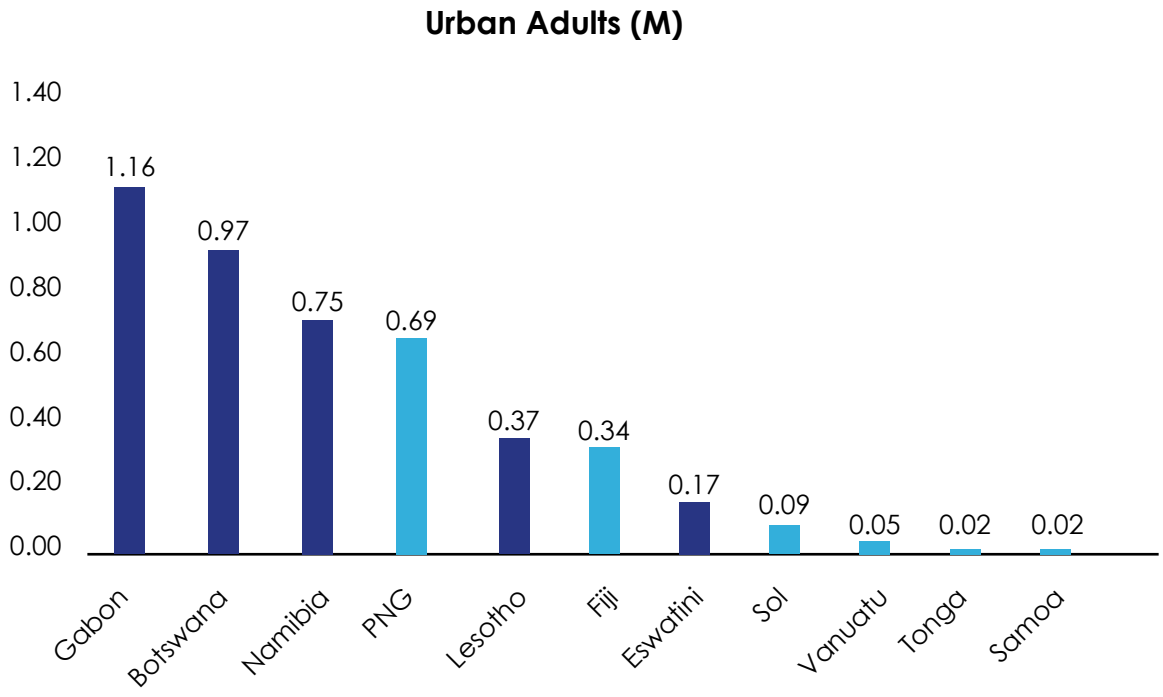
   This TAM analysis reveals important country differences in the Pacific region which means that customized strategies for countries are paramount. Fiji is much more urban than the other countries, and PNG has almost four times the population of the other five countries combined. Low GNI per capita is only really an issue in PNG, Solomon Islands and Vanuatu.

   From a market development perspective, one of the major concerns with TAM in PICs is the low number of urban adults. Experience from M-PESA in Kenya shows that early adopters to mobile money are generally urban, banked, wealthier individuals.[16] From an operational perspective this demographic is also the easiest to serve, which makes it quite important in the first years of the service. Figure 8 illustrates that these figures are below 100,000 for four of the six PICs and scaling mobile money would be unprecedented in those countries.

   If these populations of early adopters are too small to generate significant revenues in the first years of operations, it pushes providers to expand quickly into difficult rural operating environments before they have had time to introduce operational efficiencies (i.e. agent selection, liquidity management, and quality control techniques) which enable this to happen cost effectively. Those involved with the initial launching and scaling of these businesses should pay careful attention to this. Those on the policy-level should also note that this implies that these markets are likely too small to support more than one mass market financial service provider.

[15] https://globalfindex.worldbank.org/#data_sec_focus
[16] http://faculty.georgetown.edu/wgj/papers/Jack_Suri-Economics-of-M-PESA.pdf

Figure 8: Total Addressable Market of Urban Adults



Building a Business Case in the Pacific

Unfortunately, there are not a lot of published papers or data sets on the business case for mobile money and almost nothing for agent banking.[17] Generally, it is understood that services must make significant capital investments upfront and then have a period of several years of losses where operational expenses are greater than revenues. In East Africa, Safaricom invested US$30 million in M-PESA, MTN Uganda invested US$25 million, and Vodacom spent US$25 million in Tanzania.[18]

Further, at least with mobile money, it is generally accepted that "the vast majority of [mobile money] deployments launched to date suffer from underinvestment and struggle to become profitable".[19] Therefore, these businesses are expensive to launch, require years of operating losses and rarely become financially sustainable. This section notes some important benchmarks and insights used in the industry to understand the business models for both mobile money and agent banking, which are particularly relevant to PICs.

Mobile Money

1. **Capital Expenditures:** In the start-up phase (approximately three years) capital expenditures will average US$1 to US$3 million per year for technology licensing and customization.[20] This is irrespective of capital requirements the regulator may stipulate. This is a significant barrier given the limited revenues that can be generated from the small TAMs discussed in the previous section.

2. **Operating Margins During 'Start-up' Phase:** Operational costs are roughly seven times revenue during start-up, driven by customer acquisition costs and agent commissions. In absolute terms they continue to grow as the service scales, and therefore revenues must grow at a faster relative rate to achieve a positive net margin. If revenues grow fast enough, this could happen in 36 months.[21] However, the small TAM in PICs probably means slower revenue growth should be expected. Further, relatively high wages and transportation costs will likely elevate operational costs. Therefore, positive net margins will come longer after launch than this benchmark projects. M-PAISA Fiji reports it took them eight years of operation to break even.[22]

3. **Indirect Benefits:** The decreased cost of airtime distribution and reduced customer churn (attrition) are often cited as motivations for building a mobile money system and have been shown to contribute significantly to its viability. In the early years of MTN Uganda's mobile money service, retained average revenue per user (ARPU) from decreased churn accounted for 33% of revenue generated.[23] However, it is unclear if either of these factors will yield benefits in the PICs. For example, Digicel in PNG reports they are already digitally distributing airtime, so that would not be an additional benefit garnered from mobile money. Further, given

[17]Therefore, some of the sources used are quite dated, yet still represent the most contemporary citation on the topic.

[18]https://www.mckinsey.com/industries/public-and-social-sector/our-insights/mobile-money-getting-to-scale-in-emerging-markets

[19]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/11/2014_Mobile-money-profitability-A-digital-ecosystem-to-drive-healthy-margins.pdf

[20]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/11/2014_Mobile-money-profitability-A-digital-ecosystem-to-drive-healthy-margins.pdf

[21]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/11/2014_Mobile-money-profitability-A-digital-ecosystem-to-drive-healthy-margins.pdf

[22]Expert Interview with M-PAISA Fiji.

[23]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/03/moneyinmobilemoneyfinal63.pdf

Figure 9: Total Addressable Market of Urban Adults

Country	Annual Transaction Value Needed by Best Case Number of Users	GNI per Capita	Transaction Value/GNI per Capita (%)
Samoa	$25,316	$5,885	430%
Tonga	$25, 316	$5,783	438%
Vanuatu	$12,658	$2,808	451%
Sol	$6,329	$2,027	312%
Fiji	$4,219	$9,110	46%
PNG	$487	$3,686	13%

the dominance of single telecoms across PICs, churn is likely low, and therefore its reduction not a significant benefit.

4. **Transactional Value for Break-Even:** Break-even occurs at roughly US$2 billion to US$3 billion in annual transaction value, which corresponds to US$20 million to US$30 million in revenues.[24] Assuming a best case scenario of 79% of adults adopting the service in each country (as in Eswatini)[25], means that this would require more than 300% of GNI per capita in four of the six PICs to be transacted through the system annually. Therefore, using this transaction value benchmark, it would be extremely unlikely for a provider to ever break even in any of these four countries.

5. **Ratio of Digital to Cash-in Transactions:** A benchmark for service maturity is at least 30% of the GSM base actively using the service, and a ratio of six digital transactions per every cash-in.[26] This is because providers lose money on cash-in and make high margins on digital transactions like P2P. This means services like bank to wallet transfers, government to person payments (G2P), and bill pay must be launched successfully. This may be extremely difficult in PIC countries where there is already a service provider for remittance transactions (e.g. Western Union or Post Fiji). Mobile money services have shown the ability to take market share from informal remittance practices, but have had much more trouble displacing money transfer operators. This means to be successful, PIC mobile money services will need to integrate with banks, and utilities. Further, governments may want to seed demand by using the systems to make and receive transfers. Otherwise, providers are unlikely to achieve these targets.

6. **Viability of Rural Areas:** Rural areas need to be delineated into 'rural oases' which are outside urban areas, yet have significant amounts of economic activity driven by things like markets, a fuel station on a highway, or high densities of cash crops. In the Pacific, this would likely also include villages where mineral rights or other land use payments are being made to rural communities. UNCDF's work in Uganda showed that agents can function profitably in these oases, and a review of agents in leading mobile money markets in 2019 found that 85% of successful rural agents were in these 'oases'.[27] Rural areas without these economic drivers are common in PICs, and work should be done to understand the percentage of the rural population that lives outside these oases. These areas are generally referred to as 'rural frontiers' and it is likely that agents will not be able to operate profitably in these areas and therefore would need subsidies or other support.

[24]https://www.mckinsey.com/industries/financial-services/our-insights/mobile-money-in-emerging-markets-the-business-case-for-financial-inclusion
[25]This assumption is extremely optimistic given only four countries in the world have penetration rates over 50%.
[26]https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/11/2014_Mobile-money-profitability-A-digital-ecosystem-to-drive-healthy-margins.pdf
[27]https://www.bcg.com/publications/2019/how-mobile-money-agents-can-expand-financial-inclusion

Agent Banking

1. **Objectives are Important:** Not only is there a dearth of information on the business case for agent banking, sometimes the objective does not involve increasing revenue, which makes any benchmarking difficult. Many agent banking operations build agent networks around their existing banks to 'decongest them' and try to save costs on serving customers. A portion of them may also attempt to garner new clients profitably, but they are probably in the minority of operations. In the Pacific, some operations like Westpac Instore Banking, ANZ GoMoney, and BSP Rural did build agent networks beyond their bank branches designed to acquire and serve new customers. However, most of these efforts have been discontinued and the agents that remain are now oriented to supporting branch activities. These PIC examples undermine the idea that mass market agent banking can be done profitably in the Pacific.

2. **Complements vs. Competition:** In markets where banks and telecoms are allowed to compete, banks are generally at a disadvantage to telecoms in designing services and distribution networks for the mass market. In Kenya, two years after the launch of M-PESA there were more mobile money accounts in the country than bank accounts. However, by 2014 there were again more bank accounts than mobile money accounts.[28] This was largely achieved by the Commercial Bank of Africa (CBA) partnering with M-PESA on the M-Shwari service. This was a complementary relationship where M-PESA did the marketing and distribution and CBA did the product management and risk mitigation. In the Pacific, there has been a lack of meaningful partnerships like this between telecoms and banks and taking a more collaborative stance could be mutually beneficial.

3. **Positive Financial Returns Unobserved:** In Kenya three banks made mass market plays. CBA partnered with M-PESA to launch the mobile credit product M-Shwari, effectively becoming a digital lender. Equity Bank launched Equitel, a Mobile Virtual Network Operator (MVNO) to compete directly with M-PESA, and KCB launched a mass market agent banking strategy. However, three years after the launch of M-Shwari the return on assets and return on equity had decreased for CBA. At Equity Bank, before tax profits and return on assets did not increase, and at KCB profits remained largely unchanged.[29] Given these are three of the most high-profile examples of banks engaging in mass market finance, it is worrisome for PICs emulating any of these three models that there has not been a clear financial return.

4. **Deposit Mobilization:** Agent banking can be lucrative when there are low levels of liquidity in an economy and spreads are high. This builds the business case for spending the time to develop an agent network that can garner more deposits. In PICs, before agent banking operations are deployed to onboard new clients, the cost of liquidity and the spread that can be garnered from it should be analyzed to evaluate how it will compare to the operational costs of managing the agent channel.

[28]https://www.cgap.org/research/publication/banking-m-pesa-age
[29]https://www.cgap.org/research/publication/banking-m-pesa-age

Recommendations

Overall, this research highlights how challenging it has been to build viable mobile money and agent banking models globally and in the Pacific specifically. Further, it concludes that while there is significant demand for these types of services, the small dispersed rural populations of the Pacific means that building viable business models to offer them sustainably will be exceptionally difficult. Therefore, it is not surprising that many of the first-generation attempts have scaled back over time.

However, this does not mean that these services cannot be scaled in the Pacific. It just means that exceptional effort is needed to build compelling products and develop super-efficient distribution methods. Given the disparate demographics, incomes and infrastructure across the Pacific, solutions will differ by country. However, in all cases the gravity of the challenge should be made apparent before investments are made so both public and private sector partners are aware of the probabilities of success and the time and resources likely needed to make these systems work.

The following are some specific recommendations for how stakeholders might proceed in the Pacific.

Country Specific Recommendations:

1. **Papua New Guinea:** There is a general lack of demand data, but operational experts from Digicel, BSP Rural, and Westpac Instore Banking were all positive about the demand for mobile money and agent banking services respectively. In the past, some large operational mistakes have been made, and market players have underinvested in solutions and/or lacked commitment to support the ongoing operational costs of agent channels. It is likely that if adequate investment was coupled with a talented operational team and a long-term commitment that mobile money could flourish in PNG, and agent banking could likely make much deeper inroads. In the future, firm financial commitments need to be made before operations begin.

2. **Fiji:** With the only mobile money system at scale in the Pacific, Fiji is leading the region and should focus on deepening partnerships and digital transactions in the ecosystem. For M-PAiSA this means banking partnerships, increasing market share with remittances, and scaling the initial success reported with merchant QR codes. The Fijian Government may also look for opportunities to digitalize higher percentages of its payments to support the viability of these systems.

3. **Samoa and Tonga:** The extremely small, rural populations present a challenge to even the most efficiently designed mobile money service. However, given the prominence of international remittances and the high fees associated with them, mobile money or banking institutions may be able to use them as a high margin anchor product. Otherwise, these countries may choose to skip investment in cash-based services like agent banking and mobile money and begin investing in technology solutions that work on 3G networks with smart devices. These business models greatly reduce the operational costs of distribution and may be the most viable option in small high-middle income countries like these. A great place to start would be with digital small and medium enterprise merchant services. Some initial success on this has already been reported by local fintech start-ups, such as SkyEye.[30]

[30]https://www.gsma.com/mobilefordevelopment/blog/a-birds-eye-view-of-the-samoan-digital-ecosystem/

4. **Solomon Islands and Vanuatu:** These are the two most challenging countries. Their small rural populations spread across archipelagos with low levels of infrastructure make any business model difficult and over-the-top services impractical. Any viable service at scale in either of these countries would likely have to pioneer new solutions for the industry that increase average revenue per customer and significantly decrease the cost of distribution. Therefore, service development in these countries should take a minimum viable product (MVP) approach to piloting and systematically expanding as solutions are found and more difficult problems can be addressed. This will involve solving product development and distribution models in urban and rural oases before significant investments are made to expand beyond these areas.

General Advice on Strategic Operations:

1. **Senior Management Commitment is Key:** Many of the high-profile projects in the Pacific that were downscaled were done so because commitment from senior management changed over time. Often it is considered a corporate social responsibility (CSR) rather than an investment in a true business opportunity. As a result, this has a bearing on the long-term commitment to invest in these projects. In the future, development partners should ensure senior management is aware of the long-term nature of these business models and the difficulties there have been globally in making them work.
2. **Take Product Development Seriously:** Current banking products and generic mobile money transfer services have extremely limited relevance to most mass market consumers. Generally, mobile money is considered successful if customers conduct several transactions a month, and for most banking services, customers will only make small deposits in addition to maintaining the myriad of other informal money management techniques they use. Given the small populations in the Pacific, providers need to make significant investments in generating more revenue per user through customized product suites. This means doing more than building agent networks for existing products. It means spending time to understand why informal solutions are still preferred, and then designing products that compete with them.[31] Open application programming interfaces (API)s can enable technology companies to integrate and develop products, which can further drive customer acquisition and usage using the same mobile money or agency banking platforms.
3. **Build Distribution in Stages:** Providers report trying to push agent networks out into rural and remote locations before making the core business model work in much easier operational contexts like urban areas and rural oases. This is premature. Providers should focus on building efficient distribution networks in urban and rural oases first, and then using their operational experience to venture into more difficult areas, strategically pushing the rural frontier outwards. For outer island economies, providers should carefully map cash flows to leverage existing fast-moving consumer goods (FMCG) distribution networks to try and limit the need to move cash between islands.
4. **Partnerships Are Crucial:** Given the challenges of building these systems many partnerships will be needed. Public financing will likely be needed to limit the risk of investing in such expensive business models

[31] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3034175

with low probabilities of success. This has been common across the globe. Most if not all high-profile mass-market finance services have had significant donor funding. Further, partnerships between private sector actors will also be crucial, especially between banks and telecoms. Telecoms can build the most efficient distribution networks and marketing campaigns and banks should be able to improve the business model through introducing more high margin products like loans. Lastly, partnerships between PICs may be helpful to create single markets where providers can offer services in multiple countries through aligned sets of regulations.

5. **Rely on Best in Class International Expertise:** Pacific countries will likely not only have to implement best practices for strategy and operations, but they will also have to improve on them given the acute difficulties discussed in this research. To shorten the time needed to achieve this, international consultants should be relied upon heavily that have experience building successful systems in places like East Africa and Asia. They should be embedded in the financial service provider's team and help them scale the service over a period of years.

6. **Shared Infrastructure:** Given the large costs and limited revenue potential in the Pacific, shared distribution networks should be considered. However, this should be approached with caution as 1) shared infrastructure can limit the attractiveness of investment to leading providers who believe they can create a competitive advantage 2) distribution carries high-levels of operational costs, so motivated parties need to have continued involvement to cover them 3) shared distribution means that providers will compete on services (not distribution), but there has been very little service innovation in mobile money or agent banking globally 4) different services require unique agent training, location, and liquidity management techniques, so it is unclear that a generic network designed to serve all services would be customized enough to serve any of them well.

7. **Invest in Knowledge Generation:** It is especially important to better understand the high-profile services of the past which down scaled. UNCDF and other development partners should document case studies, focusing on the costs and revenues that were generated, customer use cases, and lessons for future endeavors. Further, positive deviants like M-PAISA Fiji and services from other small successful places like Eswatini should be studied to understand how successful they actually are, and what factors are driving it.

8. **Urban Merchants:** While attempts to digitalize merchant payments in the past using USSD channels and debit cards have largely been unsuccessful in the developing world, that seems to be changing with the proliferation of smart devices and more integrated offerings that go beyond payments to inventory management, financing, and customer relationship management. These solutions should be piloted in urban areas where merchants have reliable network connectivity and are most likely to be early adopters.

9. **Public Sector Demand Generation:** Pacific Island governments should consider prioritizing the distribution of their payments through mass market systems. This includes social welfare, pensions, salaries and other payments. This can be an important source of liquidity in mobile money or agent banking systems that can help them reach viability.

Appendix

Appendix 1: Downscaled High-Profile Digital Financial Inclusion Efforts in the Pacific

1. Four months after the launch of mobile money in Fiji in 2010, 25% of Fijians registered for a mobile wallet.[32] However, four years later only 7% of adults had a mobile wallet.[33]

2. Starting in 2010, Digicel launched mobile money in Fiji, Vanuatu, PNG, Tonga and Samoa. One year after launch they reported that 50% of their customers were using the service.[34] However, in addition to the survey done in Fiji mentioned above, a 2015 survey in Samoa found only 3% of adults registered for mobile money[35], and only 10% of adults were registered in Tonga in 2016.[36] The 2016 demand survey for Vanuatu does not even mention mobile money users,[37] and while no demand survey was conducted for PNG, Digicel stopped promoting its service there and the customer numbers are understood to be very low.

3. ANZ developed ANZ goMoney service and rolled it out in PNG, Samoa, Solomon Islands and Vanuatu, garnering 150,000 customers between 2013 and 2015.[38] However, ANZ officially closed the service in November 2020.[39]

4. BSP Rural built an agent banking network of 300 agents in PNG, which extended to rural and remote areas. However, currently there are only around 80 active agents.[40]

5. In 2011 Westpac, the Fiji Department of Social Welfare and PFIP partnered to deliver social assistance through bank accounts. The partnership provided Westpac bank accounts to 17,000 beneficiaries, which grew to 23,000 beneficiaries by 2018.[41] However, Westpac did not want to continue with the contract, and it has now been transferred to BSP Fiji.[42]

6. Westpac launched Instore banking in PNG in 2013 and built a network of 150 agents across rural PNG. The service played an integral role in doubling Westpac's client base from around 150,000 to 370,000. However, while the service still exists, it is not a priority for Westpac and there are currently only 42 active agents remaining.[43] The service was rolled-out in six Pacific countries, but Westpac has sold its banking business in the Pacific to KINA Bank.[44]

7. BIMA, in partnership with Digicel launched a mobile microinsurance service in Fiji and PNG, which peaked in March 2018, reaching 323,314 people,[45] but then abruptly exited the South Pacific in 2019.[46]

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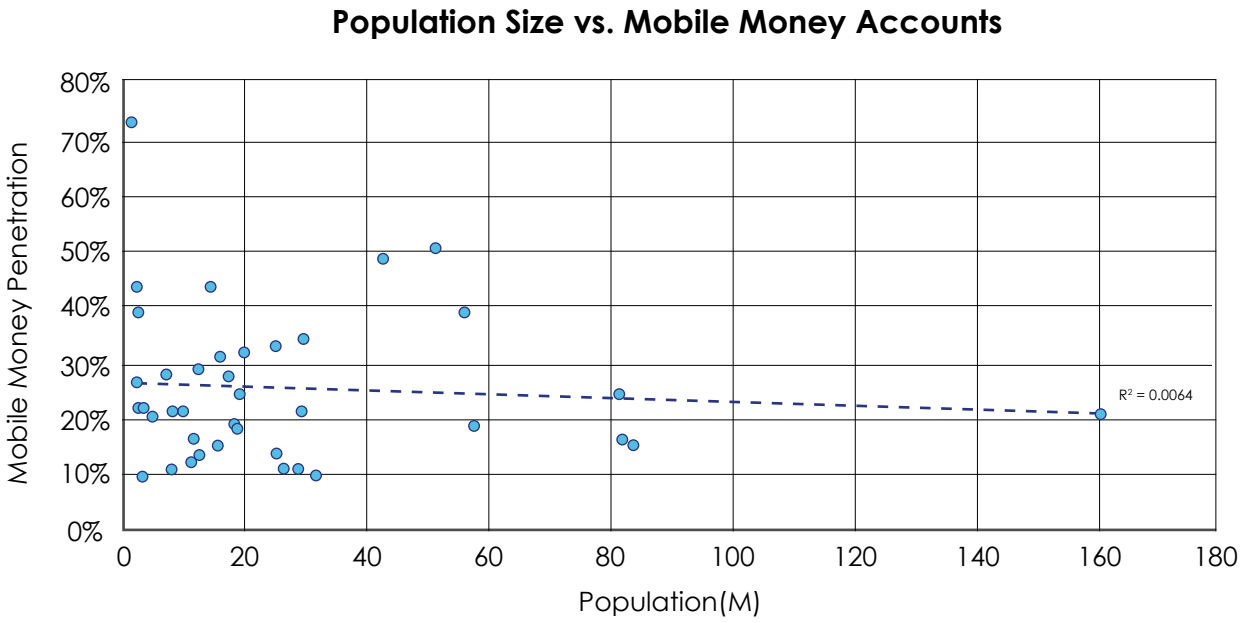
[32]https://www.cgap.org/blog/good-things-come-small-packages-mobile-money-fiji
[33]http://www.pfip.org/wp-content/uploads/2016/08/Fianancial-Services.pdf
[34]https://www.telepin.com/case-study/mobile-wallet-helps-reach-unbanked-and-underbanked-customers/
[35]http://www.pfip.org/wp-content/uploads/2016/08/Samoa-DSS-REPORT-web-version.pdf
[36]http://www.pfip.org/wp-content/uploads/2017/08/TONGA-DSS-REPORT-LOWRES-FINAL.pdf
[37]http://www.pfip.org/wp-content/uploads/2017/05/VANUATU-DSS.pdf
[38]http://www.pfip.org/our-work/work-streams/financial-innovation/anz-gomoney/
[39]Expert Interview with ANZ Senior Manager.
[40]Expert Interview with BSP PNG.
[41]http://www.pfip.org/our-work/topic-areas/g2pp2g/fijis-electronic-welfare-transfer-system/
[42]Expert Interview PFIP Senior Management
[43]Expert Interview with WestPac PNG.
[44]https://www.abc.net.au/radio-australia/programs/pacificbeat/westpac-sells-png-and-fiji-operations-to-png-bank-kina/12959792
[45]https://erc.undp.org/evaluation/evaluations/detail/9950
[46]http://www.consumersfiji.org/press-releases/press-releases-2019/cessation-of-bima-insurance-shocks-many

Appendix 2: Population Size & Mobile Money Correlation

Figure 10: The Relationship between Population Size and Mobile Money Penetration in Leading Mobile Money Countries



This figure charts 40 countries, including the 39 in FINDEX 2017 and Eswatini where 10% of adults or more were registered for mobile money. Country population in millions is on the x-axis and mobile money penetration of adults is on the y-axis. This simple correlation shows a weak relationship between the variables measured by the low R-squared value.

Appendix 3: Population Demographic and Distribution Tables

Figure 11: Analysis of PIC Demographic Variables and Small Successful Country Benchmarks

Country	Population	Adult Population (Ages 15-64)	Population Rural	Population Denisity (km.)	GNI per Capita (2011 PPP, US$)	Urban Adults (M)
Fiji	0.9	0.6	44%	48	$9,110	0.34
PNG	8.6	5.2	87%	19	$3,686	0.69
Sol	0.7	0.4	76%	23	$2,027	0.09
Vanuatu	0.3	0.2	75%	24	$2,808	0.05
Samoa	0.2	0.1	82%	69	$5,885	0.02
Tonga	0.1	0.1	77%	143	$5,783	0.02

Country	Population	Adult Population (Ages 15-64)	Population Rural	Population Denisity (km.)	GNI per Capita (2011 PPP, US$)	Urban Adults (M)	Implied Registered Adults (M) (Mobile Money)
Gabon	2.1	1.3	11%	8	$15,794	1.16	0.572
Namibia	2.4	1.5	50%	3	$9,683	0.75	0.645
Lesotho	2.1	1.3	72%	69	$3,244	0.37	0.364
Botswana	2.3	1.4	31%	4	$15,951	0.97	0.336
Eswatini	1.1	0.7	76%	66	$9,359	0.17	0.553
Max.	2.4	1.4	76%	69	$15,951	1.16	0.65
Min.	1.1	0.7	11%	3	$3,244	0.17	0.34
Average	2	1.2	48%	30	$10,806	0.68	0.49

Note: This figure shows tables of values for the PICs above and the comparative values for the five known countries with at least 20% of adults registered for mobile money and populations of 2.5 million people or less. This latter group of countries is used as a 'successful small country benchmark' with which we can compare values on the listed variables with PICs. This helps identify where the demographics in PICs differ markedly from these paradigms and may require special attention. PIC country values highlighted in red mean they are outside the maximum-minimum range of the small successful countries and that variable might cause challenges for the country. Yellow highlight means that the value is right on the cusp and is still worthy of special attention.

Figure 12: Analysis of Demographic Variables in PICs

	Mobile Money Industry Hypothesis	Global Data from the 40 countries with at least 10% mobile money population penetration	Comparing PICs to countries with at least a 20% mobile money Penetration populations less than five million (Eswatini, Lesotho, Namibia, Botswana, Gabon).
Total Population	The mobile money business model is based on high volumes and given it usually has a low population penetration (national), there needs to be a large population in a country for it to scale.	There are 10 countries (25%) with populations lower than five million in this category, including the two global leaders. Fiji is the smallest with 900,000 people. There is essentially no clear relationship between the variables (R-Squared = 0.00).	There have never been countries as small as Solomon Islands, Vanuatu, Samoa or Tonga to achieve this. Essentially, while it does not seem to be a challenge to have a population above one million, given only one (Fiji) of the 39 countries globally with less than a million people is in this category, this is either a lower bound for viability or there is a general dearth of statistics on small countries of these sizes (there may be undocumented success somewhere).
Rural Population	It is significantly more difficult to conduct agent support operations in rural areas, especially liquidity management and service quality control. Therefore, if too high a percentage of the population is rural, the service will struggle to scale.	Countries range between 0% and 83% of the population being rural, meaning mobile money is possible at a range of values. There is a strong positive relationship between the percentage of the population that is rural and mobile money penetration (R-Squared = 0.11).	Eswatini has the largest rural population (76%) for any of these benchmark countries. Therefore, there have never been small countries as rural as PNG (87%), Samoa (82%), or Tonga (77%) to achieve this. Further, Solomon Islands and Vanuatu are essentially as equally rural as Eswatini.
Population Density	Mobile money agents need a minimum population density surrounding them so they can perform enough transactions to be profitable and keep providing the service.	Population densities range from 7,953 to 2 people per square kilometre, meaning mobile is possible at a range of values. There is essentially no clear relationship between the variables (R-Squared = 0.00).	Population densities in all PICs are at least double those in Gabon (8), Botswana (4), and Namibia (3) meaning there is a set precedence for all PICs. However, in outer islands densities may be lower than the above averages and cause issues.
GNI per Capita	Mobile money relies on economic activity to drive transaction volumes, so countries with GNI per capita that are too low will not be able to support systems.	GNI per capita in this category ranges between US$83,793 and US$800, meaning mobile money is possible at a range of values. However, 21 (53%) of the 40 countries have values under US$3,500 meaning that low income countries are the most likely to have a high penetration of mobile money. There is a weak negative relationship between GNI per capita and mobile money penetration (R-Squared = 0.05).	Lesotho has the lowest GNI per capita in the group (US$3,244), which is similar to the level in PNG (US$3,686) and significantly higher than the levels in Vanuatu (US$2,808) and Solomon Islands (US$2,027). Even though there is a large number of higher population countries with lower GNI per capita figures, it is possible that these low incomes in Melanesia combined with the low population numbers could present significant challenges.
Country Income Level Classification	Mobile money usually relies on a functioning banking system to help move cash. Therefore, very poor countries will struggle. Conversely, higher income countries with advanced financial systems make it difficult for mobile money to add value garner traction and scale.	Using the World Bank income-level classification scheme, it was surprising to find that in upper-middle income, middle income and lower-middle income countries there was only an average mobile money penetration rate of 3%-5% of adults (high income was too low to average). Further, for these income classifications, there is no correlation between financial institution account penetration (excludes mobile money) and mobile money penetration (R-Squared = 0.00). However, in low income countries there is an average mobile money penetration rate of 18%, and a strong positive correlation with financial institution account penetration (excludes mobile money) (R-Squared = 0.23). Thus, while this data supports the theory that high income countries are too developed for mobile money, it does not support the idea that mobile money is a replacement for other financial services. It points to mobile money synergistically complementing other financial services. However, time series data should be analyzed to further understand the sequencing in this relationship.	All PIC countries and countries from this benchmark category are either upper-middle income or lower-middle income. While these are income levels that have rarely scaled mobile money services globally, it seems that with small countries they are common. Therefore, the data is giving mixed messages. On a global scale, low income countries have much higher mobile money penetration than all other income levels. However, with these small countries, none are low income so there may be an interaction effect where being small and low income is too difficult a challenge.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