

Master thesis

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Banking the unbanked

Utilizing current technology to bank the unbanked to support the transition from cash to online payment

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Abstract

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Acknowledgements

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Contents

Introduction	5
Technical chapter	8
Technical chapter 2	9
Proposed architecture	9
Server	9
Android	9
Evaluation	9
Discussion	9
Related work	9
Future work	9
Conclusion	10
Appendices	10
Source code	10
Copyright attribution	10

Introduction

Financial inclusion is the ability to have access to basic banking which includes efficient and secure transactions, trusted ownership, execution of payments, safe storage of money, and withdrawal of cash. This has been defined by The World Bank to be an important building block for both poverty reduction and opportunities for economic growth [6] and is one of the focal points of many international agencies, such as the International Monetary Fund (IMF)¹ and The World Bank², as well as non-profit organizations (NPOs) like the Norwegian Refugee Council (NRC)³. By having access to these tools societies will see many benefits. In Niger, a five-month relief program swapped from a monthly payment of cash to instead use mobile money services allowing for mobile commerce (m-commerce). This change saved the recipients 20 hours on average in overall travel and wait time to obtain the payments [6]. A similar study was performed in Kenya where the change to mobile money services allowed 185,000 women-headed households to increase their savings by more than 20 %, reducing extreme poverty among these households by 22 %. Additionally, access to digital payments allows for easier storage and a reduction in corruption in countries where trust in the government is low [6].

Adults without an account, 2017

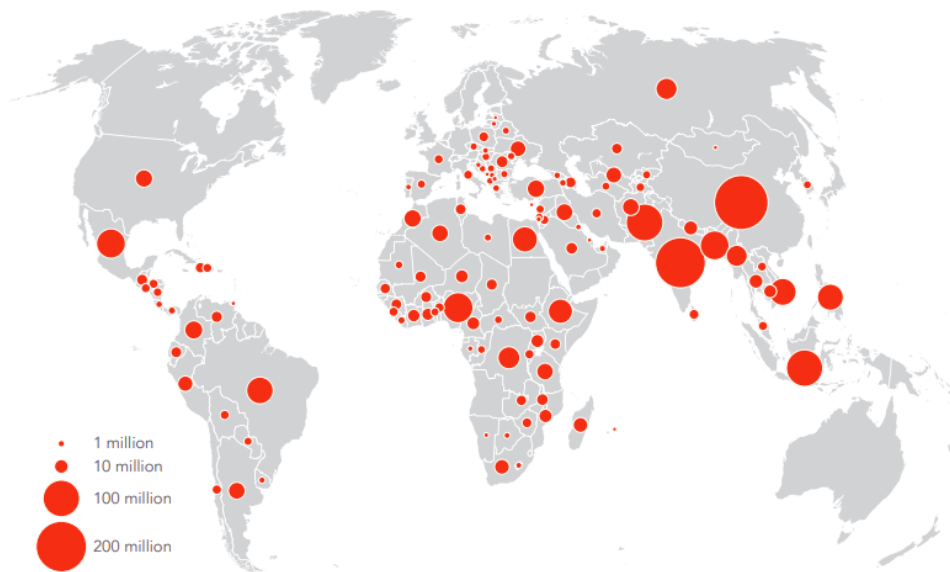


Figure 1: *The Global Findex Database*. Map of locations for unbanked adults in 2017.

¹<https://www.imf.org/en/About/Factsheets/IMF-at-a-Glance>

²<https://www.worldbank.org/en/what-we-do>

³<https://www.nrc.no/what-we-do/themes-in-the-field/cash-and-vouchers/>

The Global Findex Database reports that 69 % of adults in 2017 had a bank account [6], an increase of 7 % since 2014 and 18 % since 2011 [6]. 94 % of adults in developed countries own a bank account, whereas only 63 % of adults own an account in developing countries [6]. Globally, approximately 1.7 billion adults remain unbanked, with half of them living in just seven developing areas: Bangladesh, China, India, Indonesia, Mexico, and Pakistan. Furthermore, we can from Table 1 and Figure 1 deduce that majority of the financially excluded people are located in the Middle East & North Africa (43.5%), and Sub-Saharan Africa (SSA) (42.6%), whereas only 32.8% of the people in SSA are banked through traditional means. 20.9% are banked through mobile money accounts showing how mobile money is already blossoming in this region.

Region	Account (%)	FI account (%)	M⁴ (%)
East Asia & Pacific	70.6	70.3	1.3
Europe & Central Asia	65.3	65.1	3.2
Latin American & Caribbean	54.4	53.5	5.3
Middle East & North Africa	43.5	43.0	5.8
South Asia	69.6	68.4	4.2
Sub-Saharan Africa	42.6	32.8	20.9

Table 1: Financial inclusion statistics from six regions of the world, aged 15 and up [4]

Throughout this thesis, we will be focusing on SSA since this region is in the largest need of financial inclusion, is more susceptible to outside support, and has had more research done and data on the topics of financial inclusion and mobile money.

Typical reasons for why the people in SSA are unbanked are noted in Table 2.

Reason	Surveyed who list it as a reason (%)
Distance to bank	27
Services are too expensive	27
Lack of necessary documentation	25
Lack of trust in financial institutions	14
Religious reasons	4
Insufficient funds	73
A family member has an account	11

Table 2: Reasons for lack of financial accounts in Sub-Saharan Africa [6]

To further expand on the reasonings from Table 2. The people of countries in SSA reason their lack of a financial account with 27% of them citing the distance is a problem. Particularly in the rural areas of SSA, travel to banks is too big a reliability, especially in countries where the GDP is so little that most payments

are considered micropayments ($< \$1$).

Another common issue is the lack of documentation which 25% cite as reasoning, making the person too big of a risk for traditional banks to consider. 14% denote the lack of trust in financial institutions. Trust is an important factor for any business and it is particularly the countries who lack trust in their government who also lacks trust in financial institutions, notable countries such as the Democratic Republic of Congo (DRC) (26%) [6] who has had a long history of corruption, and Central African Republic (CAR) (24%) [6] who is in the middle of a civil war, suffer from constant instability and is ranked 1 on the global hunger index [7].

Many countries in SSA are highly religious but only a few of them list religion as a concern. Niger is a Muslim-dominant country with 98.4% of the population being M-Pesauslim [5]. Islamic finance comes with a set of rules which should be in accordance with Islamic law, particularly lending with interest is prohibited because it is deemed exploitative to earn money from interest [9].

11% cite that they don't have an account because a family member has one, this can be explained by the service cost of being banked, or because of financial literacy issues. In general, the amount of education in SSA is very low with some countries having less than two years of schooling on average [10].

When looking at developing countries and financial technology (fintech) it is important to consider what technologies are available in these areas. 1.1 billion of the financially excluded adults own a mobile phone [6], however, many developing countries have very little internet access. Our World in Data reports that for the majority of the countries in SSA, the population with access to the internet are only between 5 and 20 % [8], however for most of these countries, the mobile phone penetration rate⁵ is greater than 40 % [8]. The mobile network is more advanced than most would probably imagine. 80% of rural Africa is covered, with 22% of it being 4G, 40% being 3G and 18% being 2G. Urban Africa is fully covered with 77% 4G and 23% 3G [11]. The average download speed in this area has increased from 0.5 Mbps in 2014, to 2.4 Mbps in 2017 [2]. 100MB of network data costs on average 4.3% of the monthly GDP per capita, a decrease from 2014's 8.6%. This is fairly expensive, but the halving in cost in just three years shows the promising future mobile phones have, and will have in this region.

Banking the unbanked is a \$380 billion revenue opportunity [1] which has seen an increase in interest throughout the last decade, mainly due to the success M-Pesa has had in Kenya. M-Pesa is a mobile phone-based money transfer service launched in 2007 by the telecommunications company Vodafone Group and the mobile network operator (MNO) Safaricom. M-Pesa utilizes the Unstructured Supplementary Service Data (USSD), also known as "quick codes", a protocol similar to short message service (SMS) with the exception that it creates a connection allowing for a two-way exchange between the parties. Additionally, it doesn't store the messages on the mobile phone. The benefit of using USSD is that it is a

⁵The mobile phone penetration rate refers to the amount of SIM cards in a certain country

feature available in both smartphones and dumbphones⁶, making it available to every user with a mobile phone. With a mobile phone penetration rate of 103.769 [3], it is safe to assume that most of the citizens are covered. **Continue explaining the success of M-Pesa, or move to a different section? Or discard.**

Throughout this thesis we will take an example-driven approach of defining the needs and requirements of a mobile banking application, as well as determine the best country to onramp such a project, ensuring that the targeted country's needs, likewise, are met. When the requirements are defined we will implement a basic bank meeting these requirements, utilizing the technology that is available to them, with features that allow for any user to see the benefits of entering the mobile bank network. We will then evaluate the use cases of this product, measured up against existing mobile banks, before performing a security analysis looking at the potential attack vectors of the mobile bank. We will then discuss the implementation and reason for our choices before taking a look at the existing work done within this field which we have drawn inspiration from, as well as note what we find, could be a useful next step if this project were to be developed further. Finally, we will conclude with our findings.

Technical chapter

What needs its own section to cover? How we settled on Guinea? Why we ended up workin with USSD/Android? Obtaining trust? The story of M-Pesa?

⁶A mobile device without internet capacity ad little computing power

Technical chapter 2

Proposed architecture

Design

Server

Database

USSD API

Android API

Android

Evaluation

Discussion

Related work

Future work

Pre-commit

The implementation currently works in 3 stages.

1. A request is made for one person to send money to the other.
2. the requested person and the requesting person meet and trades the cash.
3. The requested person confirms the request in 1.

This implementation does not take into account whether the requestee has the funds to finish the transfer. A pre-commit would be in order to prove that there is a sufficient amount of funds, thereby reducing theft opportunities.

Blockchain technology

Move to discussion instead

From **section xx** we determined that a E-money license costs **xx**, due to the un-regulated nature of cryptocurrency it might be easier to work with cryptocurrencies instead. There are additional benefits to this.

1. Stablecoins (cryptocurrency typically pegged to the US Dollar) can allow for people in fluctuating economies to enter a stable one.
2. Cryptocurrency is currently a popular means of investing and is being sought by multiple people.
3. Cryptocurrencies allow for easy cross-border transfers.

Conclusion

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Appendices

Source code

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