A Proposal for Implementing HyperOne

For Hyper Big Bank

Machine Learning and Big Data Part 2

Part 2

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Abstract

The report outlines the recommended working opertation of HyperOne. Hyper Big Banks new project aims to be a technology-driven next-generation bank which conducts all its operations from the vicinity of the automated teller machine and movile app. The report shows the technical requirements and explores the use of technological products such as Azure and GCP.

In order to enhance and achieve the target. It shows the potential for growth HyperOne has considering the number of unbanked people in these countries. It explores the rationale behind the suggestion we made for strategic locations such as India, Nigeria and Brazil. We also analyze the impact that HyperOne can have on the financial markets in emerging countries and worldwide as a whole.

Keywords: ATM, Payment Systems, Emerging Countries, HyperOne, Hyper Big Bank

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Table of Abbreviations

1- ATMs – Automated Teller Machine

2- AML – Anti Money Laundering

3- CTF – Counter Terrorism Financing

4- POS – Point of Sale device

5- RBMBS - Relational Database Management System

6- CBN – Central Bank of Nigeria

7- AI – Artificial Intelligence

8- ML – Machine Learning

Introduction

HyperOne is one set to revolutionize the financial world in emerging countries, it is set to disrupt existing activities while achieving the impossible; bringing on board the unbanked. HyperOne promises financial inclusion for the many that are sidelined by the current financial infrastructure. An important factor that often discourages the unbanked is the tedious process and strenuous documentation required when opening a bank account, especially when saving a menial amount. HyperOne comes in to solve the issue, by allowing one to have access to basic banking facilities requiring only a mobile number.

One of HyperOne's strongest advantages is the use of technology to minimize human presence by making use of ATMs. ATMs remain popular in emerging countries with places such as Nigeria recording over $30 billion worth of ATM withdrawals annually (CBN, 2020) this figure is six times that of payments made via point-of-sale devices. This goes to prove the popularity and importance of ATMs in emerging countries, it also shows the potential they have as a means of onboarding the unbanked via the means of HyperOne. The impact HyperOne poses on the unbanked is limitless. By simplifying the account opening process, requiring only a mobile number, it removes the huge barrier placed on these individuals.

However, this poses a risk to regulators, as it makes the process of implementing money laundering regulations and counterterrorism more difficult. The report will explore ways of mitigating this whilst adhering to regulatory requirements. Furthermore, this report will look into the viability of the project, the implementation challenges behind the project and the potential the project hold. It will also explore the technical, economic, and financial requirements to ensure the best execution of the project. The country of operation is crucial to the success of the bank and we explain diligently why we picked these countries to maximize the presence of HyperOne. We explain why we believe limiting HyperOne to only face and voice recognition can limit the adaptation of HyperOne and why we believe the Bank should also integrate itself with the already existing payment infrastructures to promote its growth.

From the critical analyses carried out on HyperOne, the environment it tends to operate in and its business model has let us conclude that HyperOne is indeed a viable project with tremendous potential provided it improves the structure before commencing operation.

Business Model

The HyperOne Business model involves the use of one's mobile number to offer them basic financial services using their face and voice as means of authentication. HyperOne transfers are to be carried out only with other customers and are not set to have any means of making payment on other platforms such as POS or online. While the fundamentals of HyperOne are solid it possesses room for much more growth. HyperOne can be integrated with traditional financial infrastructure to allow for transfers between local accounts. With the target audience mostly being youth, most would possess a smartphone, especially considering smartphone penetration in emerging markets is set to grow to 70%. (Inside Telecom, 2020) We recommend for HyperOne accounts be categorized into 3 major segments namely:

1- HyperOne Bronze: This tier of HyperOne only requires a phone number to carry out transfers. It is limited strictly to transfers on the HyperOne network. The number of transactions carried out also has a limit to aid in controlling money laundering. This is reserved especially for those without a smartphone.

2- HyperOne Silver: In this tier users have the opportunity for added benefits such as a virtual and physical card. One would have to qualify for this depending on their spending.

3- HyperOne Gold: This would involve full-blown banking and additional data. Using data analytics tools to identify potential clients in certain products and connect them with the providers. HyperOne would not have to offer the products but would act as an intermediary between providers.

Technical Outline

The technical details of the project are important seeing as it deals with a unique set of data, we look at the data architecture. This would be crucial in helping us decide what type of systems we need to use and also in determining the right location and the charges surrounding HyperOne's operation.

Cloud vs In House

The main data requirement that set HyperOne different is the use of facial and voice recognition. These would necessitate the deployment of a big data approach as unlike a traditional ATM, it deals with additional data making the use of traditional a Relational Database Management System (RBMBS) difficult.

High efficiency tends to correlate with higher profits, thereby we need to ensure we make use of the best and most cost-effective means of handling data. This possesses a challenge in deciding whether to make use of Cloud Service Providers such as Amazon Web Services or to build an in-house data system. The concerns with using a cloud revolve around the control over data security and scalability issues. In the table below we compare both options to see which suits us more.

	IN HOUSE	CLOUD
COST	Expensive	Cheaper offering pay-per - minute
MAINTENANCE	Planned and Known maintenance	Unexpected down time
SECURITY OF DATA	Complete Control over Data	No control over data
COMPLIANCE ISSUES	Can be tailored to suit compliance requirements	Lack of control results in less credibility
SCALABILITY	Less Scalability	Easier to scale across the world

Table 1 Comparison of In House and Cloud Services

Seeing as HyperOne is only starting and we are limited to two countries we recommended the use of a cloud service to understand the market properly and any challenges that might spring so that we can use it to implement better decisions when building our in-house system.

This is why we suggested making use of a combination of Microsoft Azure and Google Cloud Platform for the first year of operation. Azure is a leader in areas of biometric security, their facial recognition system performs better than that of competitors such as AWS. (Wright, 2020) Unlike others, Azure is also highly compatible with .net based applications it also allows for Hybrid solutions and it is easier to learn. The stronger PaaS capabilities it offers allow for the rapid deployment of cloud services. The reason for the choice of two cloud providers is to deploy a multi-cloud strategy. This would help reduce the downsides of cloud services, reduce downtime, and also enhance data security. As proven by (Leo John, 2017) multi-storage cloud strategies are also an alternative and better way of ensuring maximum data protection by allowing HyperOne to store the data over different clouds.

As we are dealing with sensitive data, we recommend encrypting the data before storage on the cloud. To also ensure further security, the adaptation of discovery tools is essential, this ensures that access to data is limited to only the chosen individuals. To incorporate the multi-storage cloud, IBM's multi-cloud manager can be integrated into the system to ensure the data is effectively managed. A multilayered approach to identity verification is critical to safeguard the customers, which is why we recommend soliciting the services of Thales, a digital security company. Their digital solutions can be used for onboarding clients and storing their biometric data. Thales also has a partnership with Azure making them compatible. Their biometric security feature also allows the consistent capture of data whenever a user is using it adding it to the database and comparing it to the reference data.

Thales has also introduced a biometric debit card which can be used to make purchases without a pin. (Thales Group, 2022) This technology works with existing pos machines and fits with the mission of HyperOne. As stated earlier we recommended the addition of a debit card to allow users of HyperOne to carry out purchases in stores or when in a region where an ATM is not available. This would help bolster financial inclusion.

Data Streaming

The data required to complete transactions must be available to use in real-time. Here the services of data streaming platforms come in. The data streaming services allow you to process, store, analyze and act upon the data as it is being generated in real-time. Apache Kafka ensures real-time risk analysis, transaction analysis and data streaming. The use of Apache Kafka's services would ensure real-time transactions, reducing the chances of fraud. Kafka also improves the customer's experience by reducing any chances of false positives.

Data Pipeline, Security and Regulations

The data pipeline below shows the process of how the data move in the system.

Figure 1 Data pipeline

The data protection policies across different countries will vary, thus HyperOne would have to ensure that any AI or ML is GDPR compliant. The systems would need to be transparent and non-discriminatory. The systems used can be trained to ensure they are compliant by making use of systems such as Federated Learning which personalizes the model on the user's devices. All the training data remains on the device and is not uploaded to the cloud.

Integration with the database of countries

Most countries require users to register their data before obtaining a sim card, they ask for details such as address and fingerprints, integration with the infrastructure would allow HyperOne to get additional data about the customers. The process of registration also often asks for a means of identification. This integration and access to existing data can help strengthen the profiles of candidates, it will also help when tackling issues related to money laundering.

The added advantage this integration comes with is limiting the number of accounts one can create. By integrating with the database a person will be limited to the number of accounts he can open as his phone numbers would have to be registered to him.

Bluetooth connectivity

The atm machines should be fitted with Bluetooth technology and QR codes which would connect to the user's phone allowing one to carry out transactions at ease. This would make transactions faster to carry out while also helping with the use of smart apps on the atm machine.

Application Programming Interface

To engage more clients and generate an additional source of revenue for HyperOne we recommend the addition of smart apps on the ATM terminals and mobile app. HyperOne would allow external providers to have their apps hosted on the HyperOne infrastructure. HyperOne would then be used to make payments, pay electricity bills and other daily transactions.

Onboard Diagnostics

The maintenance of the ATM machines is crucial, the presence of an onboard diagnostic system will aid in knowing when an issue is present. It will also help inform when a particular machine is out of cash.

Operational Model

Proposed Countries

Seeing as youths compromise the initially targeted clientele for HyperOne, we focused on countries with a high youth population. The locations are also strategically chosen so that HyperOne has operations in major locations across each continent.

In the first year of operation, we recommend Nigeria and India. These countries have one of the youngest youth populations in the world, with these numbers set to grow at 17% in India and 44 % in Nigeria respectively. (United Nations, 2015) This gives us a larger clientele to work with. Furthermore, these countries also have a high number of unbanked with a tech-savvy population and unlike China less competition. Nigeria and India are also home to nearly $110 billion of diaspora remittances.

In the second-year operations are to be zoned to Indonesia, Brazil, and Egypt. Indonesia is home to over 65 million youths aged 18-35 (United Nations, 2015) with an internet penetration of 69% and 53% (Cash Matters, 2021) of the transaction still cash denominated it provides a large audience base to work with. It also strengthens the operations in Asia. Brazil, on the other hand, is a powerhouse, the FinTech scene has seen rapid explosions with nearly 30 million youth base it is the recommended country to put HyperOne's operation in South America.

Most of the operations in year 3 will be in Asia, this is done to utilize the maximum potential without stretching resources too thin. These countries also have a thriving youth population. Pakistan is also known to be a highly cash-based economy, with nearly 60% of all transactions being cash denominated. They are also home to a thriving youth population with high tech presence. The Philippines and Thailand also follow a similar pattern of high youth presence and a high cash dominance.

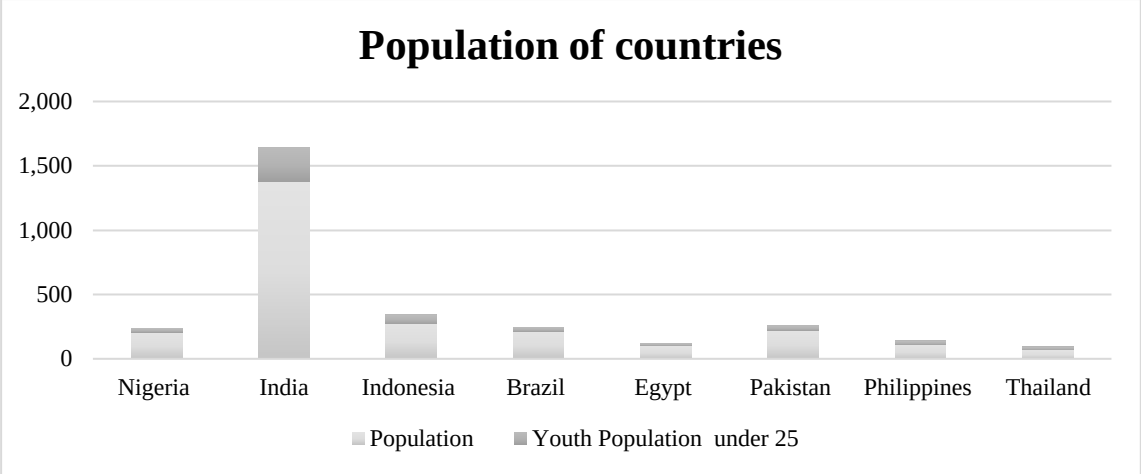

Figure 2 Population of countries in millions

Charges and Fees

HyperOne depends on charges from cash withdrawals identified as X% while charges for transfers for the receiving customer are identified as Y%. The rate to charge for the withdrawals and transfers are important. To help determine the right amount to charge we compare the average cost of transactions across the countries we recommend operating in over the next 3 years. Majority of local banks allow for free transfers and withdrawals at local ATMs, this poses a threat as it would force us to cut down the percentages to compete. With inter-banking transfer however, the percentages range between 0.5% - 1%.

Country	Charges
India	3 free transactions later 20 rs + taxes
Indonesia	No charge only when used outside of home network
Pakistan	0.1% or PKR 200 per transaction whichever is lower
Nigeria	• N10 charge for a transaction below N5000 • N26 for the transaction of N5001 to N50,000 • transactions above N50,000 will be charged N50.

When comparing the costs between different countries we see the need for a tailored percentage for each country. One percentage would not fit all the countries. We also recommend making the percentages based on the amount being transferred or withdrawn. Furthermore, HyperOne should attempt to match or set a lower percentage than that which is offered by the local banks to attract more people. HyperOne would also need to consider the taxes to be levied on the customers. For people who opt for silver and gold features they get charged depending on their usage. Cash withdrawals should have a recommended standard charge of 0.5% for lower transactions and 1% for the higher ones. Transfers should also range between 0.5% - 2%. The option for a flat rate + taxes should also be considered depending on the location and the taxes on transactions.

Anti-Money Laundering & Counter-Terrorism Financing

Money laundering is an important factor that needs to be tackled. Due to the low identification requirements of HyperOne it can easily be used to launder money and finance terrorism. One way of combatting this would be by implementing the risk shield inform a system which uses machine learning and smart algorithms running the transaction across different databases to work. As the face id is incorporated it will run the face across the database to ensure the client does not have an existing account.

Customer Service

Customer service experience is important and often a deciding factor when using a bank. HyperOne can have the customer service via the means of intelligent chat bots. The bots can be tailored to any language in the country of operation and would be available 24/7 to help with any queries. As some users are not literate, a voice communication option would be provided to assist with such. For matters unable to be resolved, a video call with a customer representative working remotely would be provided to assist with these queries. The customer service representatives would be hired locally to ensure they're familiar with the environment and local languages but work remotely and report to the main HyperOne branch.

Disability

With a recent review suggesting that 1 out of 5 people have a disability it would be essential to ensure some of the ATMs are friendly.

Security and Cash Deposits

An important issue when looking at the E2E chain of trust revolves around security of users. To prevent users from withdrawing money out of their own will, the users will be given an emergency phrase to use when making the transaction. This would ensure the transactions are halted and temporarily suspended. Advance AI voice analysis tools can also be implemented to tell when the user is distraught or scared. To ensure that only legitimate cash is deposited and withdrawn, intelligence engines should be implemented to identify and reject counterfeit. The ATM machines should also be fitted with smart cassettes to aid for cash

forecasting and monitoring paper receipts. The data obtained would also be beneficial for big data analysis, giving HyperOne insight in consumer spendings.

Post year 3 plans

With an estimated customer base of 20 million people across 8 countries, HyperOne would have increased use across the countries. Remittances in emerging markets have been rapidly rising, with the world bank (World Bank, 2021) predicting a growth of 7.3% to reach $5889 billion. This opens a myriad of opportunities for HyperOne. Being strategically located across top emerging markets across the world gives HyperOne the opportunity to become a top remitter. By using the HyperOne mobile app, users across the world can then register to send money across the world. It would also facilitate to allow for a transfer directly to an ATM machine so that the receiver would directly withdraw the money without the need for a bank account. HyperOne can also partner with existing companies such as western union by acting as agent points where a user can send and receive money. We also recommend for HyperOne to allow one to turn their phones into payment terminals. Allowing every customer to use his mobile phone for contactless transactions on the merchants' phone.

Further Discussions

As HyperOne does not intend on running physical branches it would have to consider how to run the management of the ATM on a day-to-day basis. It would have to find a way to ensure maintenance is carried out, and ensure machines are adequately funded at every given moment. This led us to recommend the use of agency banking, by outsourcing the management of the ATM to an external financial provider in exchange for a percentage of the profit made on the machine. HyperOne can also use the agency banking model to onboard customers.

It is also recommended for HyperOne to maintain at least 1 main branch in every country of operation. This branch would be in charge of training operatives on machines, ensuring the local guidelines are adhered to. They would also be responsible for any and all interactions with the governments surrounding policies, getting banking licenses etcetera. These branches can also help run the marketing campaigns to attract new customers. HyperOne would also have to consider how to onboard customers, a recommended approach is by the use of referral rewards for people that sign up. This could be in either form of cash or free transaction. The partnerships with other companies will help.

HyperOne should also consider having a USSD code in countries of operations to aid when making transactions in regions of little/no internet presence.

Bibliography

Cash Matters, 2021. *Cash Matters.* [Online]

Available at: https://www.cashmatters.org/blog/indonesia-53-percent-pos-transactions-cash

[Accessed 2022].

CBN, 2020. *E Payments Statistics ,* Abuja: CBN.

Inside Telecom, 2020. *Inside Telecom.* [Online]

Available at: https://www.insidetelecom.com/Techonlogy/smartphone-penetration-growth-in-emerging-markets

[Accessed May 2022].

Last Name, F. M., Year. Article Title. *Journal Title,* pp. Pages From - To.

Last Name, F. M., Year. *Book Title.* City Name: Publisher Name.

Leo John, D. K., 2017. Enhanced Security for Data Sharing in Multi Cloud Storage (SDSMC). *International Journal of advanced Computer Science,* 8(3).

Shrimpton, D., 2022. *Talking Retail.* [Online]

Available at: https://www.talkingretail.com/news/industry-news/is-it-extinction-or-evolution-for-the-cash-machine-16-05-2022/

[Accessed 04 2022].

Thales Group, 2022. *Thales Group.* [Online]

Available at: https://www.thalesgroup.com/en/markets/digital-identity-and-security/banking-payment/cards/biometrics-in-banking

United Nations, 2015. *Growth Projections 2030,* New Yorkk: UN.

World Bank, 2021. *World Bank.* [Online]

Available at: https://www.worldbank.org/en/news/press-release/2021/11/17/remittance-flows-register-robust-7-3-percent-growth-in-2021

[Accessed 20 05 22].

Wright, L., 2020. *Core.* [Online]

Available at: https://www.core.co.uk/blog/azure-vs-aws-why-people-are-choosing-the-microsoft-cloud