

# **Accelerating Financial Inclusion in Cambodia Using Artificial Intelligence & Machine Learning**

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## **Abstract**

Promoting prosperity and protecting the planet at the same time requires us to end poverty and simultaneously promote economic growth and address social needs. This is also reflected in the form of 17 sustainable development goals agenda set by United Nations. Financial inclusion has been identified as an enabler for 7 out of those 17 sustainable development goals. Financial inclusion requires individuals and businesses to have access and ability to do financial transactions, payments, get credit and insurance. Cambodia represents one of the fastest growing economies of South East Asia. Financial inclusion is one of the top priorities, articulated by National Bank of Cambodia as well.

This paper examines the role of emerging technologies such as artificial intelligence, machine learning, and deep learning in accelerating financial inclusion, especially through using alternative credit data to provide credit to thin-file customers. It further evaluates whether such technologies can be leveraged to accelerate the financial inclusion in Cambodia.

## **Introduction**

World Bank considers Financial inclusion a key enabler to reduce poverty and boost prosperity in developing nations. Financial inclusion involves providing access to financial products to the weaker

sections at affordable cost by mainstream institutions. As per one of the reports (Global Findex, 2014) an estimated 2 billion adults worldwide were excluded from formal financial system and thus were not able to access the various financial products and services. This number of unbanked adults worldwide was at 1.7 billion in 2017 (Global Findex, 2017) .

Financial services are enablers of sustainable and long-term development. Role of financial services is of paramount importance in promoting financial inclusivity. From facilitating investments in education and health to enabling people to manage financial emergencies, role of access to financial services in enabling development is of prime importance (Financial Inclusion Overview, 2018).

Cambodia is one of the fastest developing economies of South East Asia. With population of 16.2 million (in 2018) and GDP growth rate of 6.9% (in 2018), it is one of the fastest growing economies of South East Asia (UNdata, 2018). In past two decades, Cambodia has achieved an average growth rate of 8% per annum and what's remarkable is that poverty rate, which stood at 53% in 2004 came down to 13.5% in 2014. Financial sector has contributed significantly to this rapid growth in Cambodia. One of the key objectives of Cambodia's Financial Sector Development Strategy 2016–2025 is to enable and support sustainable economic growth. Cambodia's Financial Sector Development Strategy 2016–2025 envisions a sound, efficient, diversified, and inclusive market-based financial system. In future strategy and plans related to Banking sector, Financial Sector Development Strategy 2016–2025 clearly highlights that NBC will allow space for opportunities and creativeness towards the attainment of financial inclusion (Financial Sector Development Strategy, 2017).

## **Financial Inclusion Priorities & Progress**

### **Financial Inclusion Priorities in Cambodia**

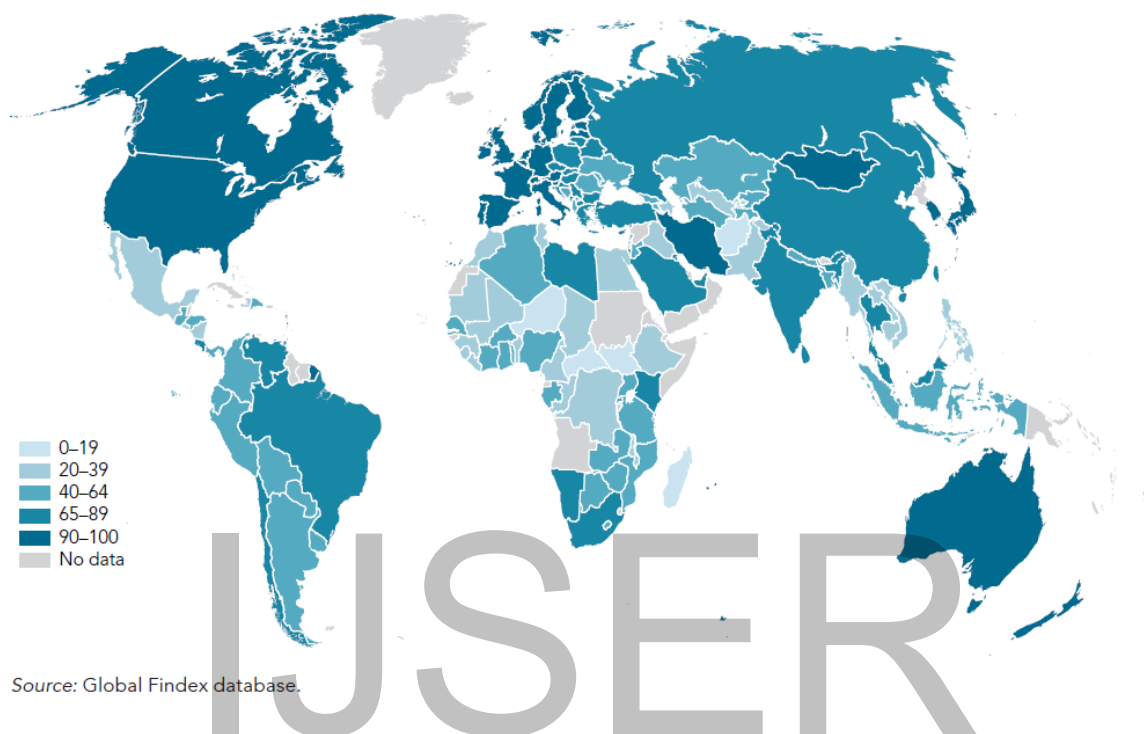
Financial inclusion is one of the top agenda items for Director General of National Bank of Cambodia. In an interview with GovInsider, Her Excellency Chea Serey (Director General, National Bank of Cambodia) mentions that improving access to financial services is one of the top priorities of National Bank of Cambodia. She mentions that “It's very important to have an inclusive economy and also to have efficiency in whatever you are doing.” (Inside Cambodia's Financial Revolution, 2018)

### **Financial Inclusion Indicators Analysis**

As per World Bank's Global Findex Database 2017, 51% of adults had an account (globally). This number went up to 62% in 2014 and was at 69% as per the report in 2017. In high income economies,

94% of adults have bank account whereas in developing economies, this number goes down to 63%. Account ownership here is based on account with either a bank or a microfinance institution or any other regulated financial institution.

**Today, 69 percent of adults around the world have an account**  
Adults with an account (%), 2017



In 2017, about 1.7 billion adults did not have any account (with a financial institution or through a mobile money provider). Almost all of these unbanked adults are from developing world. Cambodia has 8.5 million adults without an account.

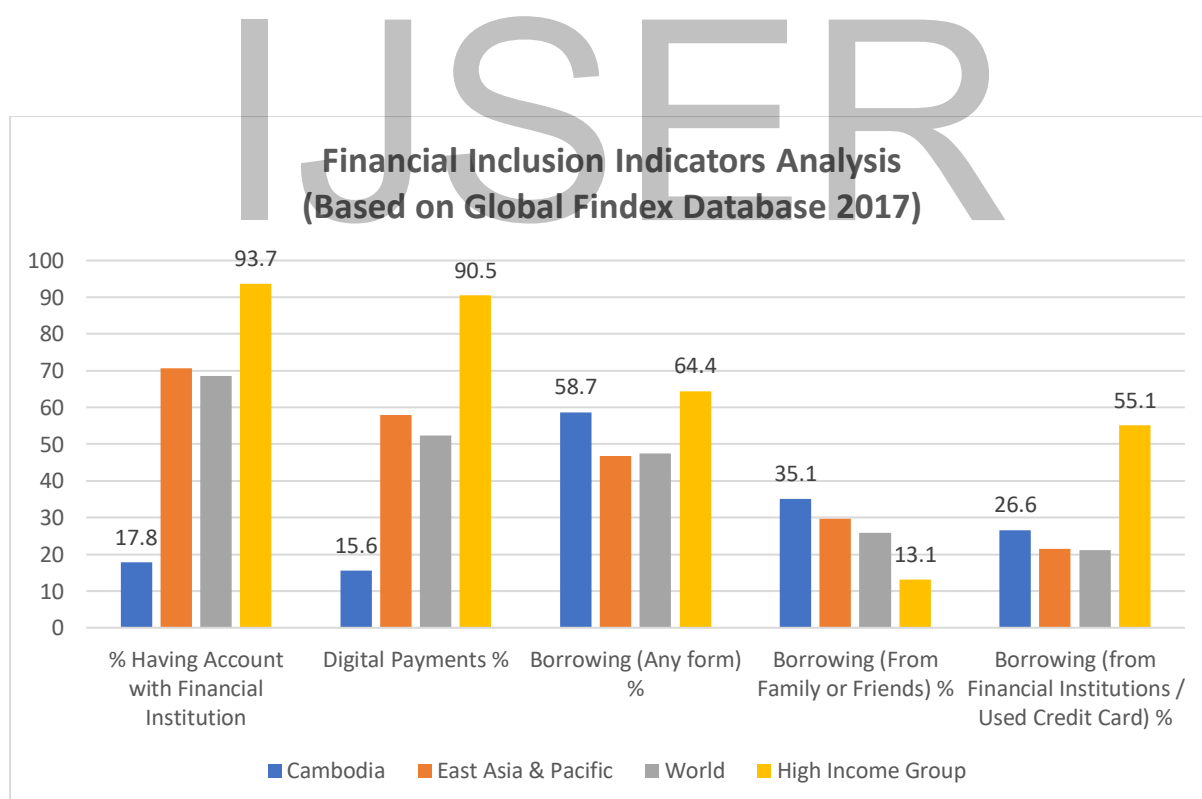
For Cambodia, 21.7% out of 10.8 million in 15+ age group had some or other form of an account. 17.8% had account with financial institution and 5.7% had mobile money account. Digital Payments (which implies having made or received digital payments) in past year was at 15.6%. In terms of credit facility, 58.7% borrowed any money and 35.1% borrowed from family or friends. It was only 26.7% who used credit facility from financial institution or used credit card.

For East Asia & Pacific, 70.6% out of 1.6 billion in 15+ age group had some or other form of an account. 70.3% had account with financial institution and 1.3% had mobile money account. Digital Payments (which implies having made or received digital payments) in past year was at 58%. In terms of credit

facility, 46.8% borrowed any money and 29.6% borrowed from family or friends. It was only 21.5% who used credit facility from financial institution or used credit card.

For World, 68.5% out of 5.5 billion in 15+ age group had some or other form of an account. 67.1% had account with financial institution and 4.1% had mobile money account. Digital Payments (which implies having made or received digital payments) in past year was at 52.3%. In terms of credit facility, 47.5% borrowed any money and 25.8% borrowed from family or friends. It was only 21.1% who used credit facility from financial institution or used credit card.

For group constituting high income countries, 93.7% out of 992 million in 15+ age group had some or other form of an account. 93.7% had account with financial institution. Digital Payments (which implies having made or received digital payments) in past year was at 90.5%. In terms of credit facility, 64.4% borrowed any money and only 13.3% borrowed from family or friends. It was 55.1% who used credit facility from financial institution or used credit card. (Global Findex, 2017)



It is evident from above analysis, comparing Financial Inclusion indicators for Cambodia against High Income group countries cluster, that following are few of the dimensions that needs to be encouraged to promote financial inclusion in Cambodia:

1. Increase in % of adults having account with a financial institution
2. Push for increase in digital payments
3. Reduction in borrowing from family and friends and corresponding increase in borrowing from financial institutions (driving the shift from informal credit/borrowing to formal credit/borrowing)

## **Formal Borrowing Approvals**

### **Historical approaches**

Historically approvals of formal borrowing (loans/borrowing from financial institutions) are based on assessment of credit risk. And one of the most important parameters driving credit risk assessment is credit history. Wells Fargo explains them as “5 Cs”, with first C reflecting credit history. It is based on track record of payments made over a period of time. Lenders who have extended credit to borrower in past share the payment history (and some more data) that constitutes credit history and eventually forms an important part of an individual’s credit score or credit worthiness. (5 Cs of Credit, n.d.).

Assessing creditworthiness of customers based on their past payment history has played significant role in credit decisioning. Past-payment-history based credit decision requires existence of such past payment history and also availability of data reflecting this history (mostly through some form of credit bureau). The challenge of course is that building a credit score requires to have received a loan and sanction of loan requires having a credit score. Can advances in technologies, such as artificial intelligence and machine learning be used to create new paradigms in assessing creditworthiness of individuals and thus driving the agenda of financial inclusivity?

### **Recent shift to Alternative Data**

In his 2015 paper in American Banker, Brian Browdie mentions that alternative data like utility and rent payments, mobile phone bills etc., which traditionally had not been part of typical credit score evaluation, is being used by some companies for lending, marketing, and other decisions. This alternate

data can help profile the borrower and “predict” creditworthiness as opposed to just “assess” credit worthiness based on past data. Bills payment records (not the credit repayment records), patterns of purchases, intent and character portrait, social circle and influence, and many more non-linear data items can be used to “predict” the credit repayment behaviour. (Browdie, 2015)

## **Alternative Data, AIML (Artificial Intelligence & Machine Learning) in Credit Decisions:**

### **Analysis of three leading FinTech Companies**

FinTech start-ups have responded to this need of leveraging alternative data to promote financial inclusivity. Alternative data represents any data, other than loan / credit re-payment data, which is gathered from sources that are neither the banks and traditional credit bureaus.

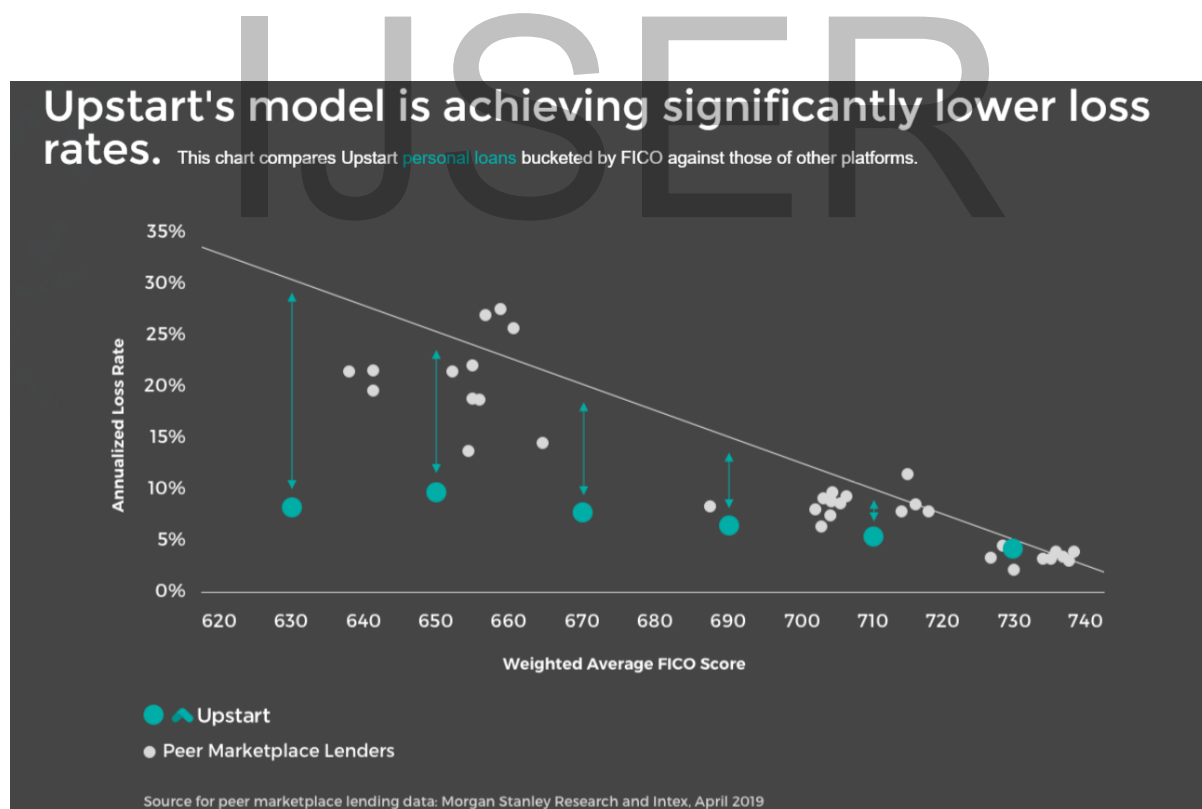
We look at few such organizations that are working in this field, namely LenddoEFL, CreditVidya, and Upstart.

**LenddoEFL** is one of the leading organizations in credit scoring using alternative data. They use machine learning and artificial intelligence on massive amount of data that enables their clients (lenders) to support financial inclusivity. Lenddo’s co-founders looked into the loan requests coming from their young staff, and realized that more than a billion people lacked access to credit, had no financial repayment history but had online presence through social media and access to and usage history of smart phones. They developed algorithms using entire digital footprint of potential applicant consisting of (but not limited to) their Contacts, SMS, Call History, User's Location & Browsing, and their Facebook, LinkedIn, yahoo, google, and other social media platform data that creates LenddoScore and helps Lenddo’s clients in credit decisions. LenddoEFL claims that their product LenddoScore has helped them increase approval rates by 15% and decrease default rates by 12%. (include1billion, n.d.)

**CreditVidya** was founded in 2012. It uses alternative data for the credit underwriting process, by assessing potential borrowers’ risk of default, for unsecured loans. CreditVidya’s CVScore takes both

alternative data and traditional bureau reports and processes it using Convolutional Neural Networks (CNN). CreditVidya claims that usage of this CNN based algorithm has enabled their clients to increase approval rates by 15% and achieve 33% lower risk of default at same rate of approval. (Reimagining credit underwriting, 2018)

**Upstart** looks at not only traditional credit history information by way of FICO scores and few other parameters, but (more importantly) takes into consideration potential applicants' education, SAT scores, field of study, their GPA etc and puts this data through machine learning algorithms to predict creditworthiness of individuals. They claim that usage of these non-conventional variables helps provide superior loan performance and improve consumers' access to credit and thus enabling financial inclusivity while simultaneously reducing the risk and costs of lending. Upstart provides a comparison of reduction in annualized loss rate using Upstart Scores as against weighted average FICO scores. While on a 700+ average FICO scores, the difference is not much, for average FICO scores between 600 to 650 there is close to 15% reduction in annualized loss rates. (Upstart | Results to date, 2019)



Alternative data can be sourced in multiple ways such as:

- Debit & Credit card transactions data

- Utility bills payment data
- Rental bills payment data
- Social profile data, social network data, digital footprint information
- Psychometrics data through surveys and questionnaire

As per research done by FICO, these data sources enhance predictive value up to 5%, and even up to 10 to 15% in some cases. (Gandhi, 2017)

## **Financial Inclusion Agenda and role of AIML**

It is evident from above examples that usage of artificial intelligence, machine learning and deep learning algorithms can help increase availability of credit to thin-file customers (those who don't have prior credit history) using alternative data and at the same time help manage the risk of lending in an optimal manner. Artificial Intelligence & Machine Learning have a significant role to play in driving financial inclusion. FinTech's across the globe are using these technologies and delivering positive results, especially in the context of driving financial inclusivity agenda in emerging markets.

In Cambodia where 35.1% adults are borrowing from family and friends and thus not having formal credit history, alternative data will play an important role in driving the shift from informal credit / borrowing to formal credit / borrowing. The examples of LenddoEFL, CreditVidya and Upstart, where use of alternative data coupled with power of artificial intelligence and machine learning has enabled increased credit approval rates and lower risk of default, clearly indicate the potential of applying the same model (of using alternative data and AIML) in Cambodia to accelerate the financial inclusion.

## **Ethical Dimensions on Usage of AIML & Alternative Data in Credit Decisions**

Promise of artificial intelligence and machine learning also brings with it concerns about privacy and legal aspects. Not everybody is comfortable when their personal sensitive information is available in its entirety to a company or to a group of companies. Even if company is determined to make only ethical



usage of this data, there is always a risk of data security breach. Further, there is always a possibility of accidental or purposeful discrimination resulting in biases getting introduced. These concerns and risks need to be addressed while leveraging machine learning and deep learning for driving credit decisions. However, benefits of using them to drive financial inclusiveness outweigh the risk factors, at least for the time being. (Kirchner, 2015)

## Conclusion

For world to be a better place, equitable financial inclusion is of prime importance. This has been recognized worldwide and hence financial inclusion is on top of every developing nation's agenda. Cambodian economy has made significant strides in last 2 decades. Its one of the fastest growing South East Asian economy. Cambodia recognizes the need of financial inclusion and thus it figures in one of the top priorities of National Bank of Cambodia's Financial Sector Development Strategy 2016-2025. Providing easy access to credit and driving a shift from informal credit (borrowing from family or friends) to formal credit (borrowing from financial institutions) is important to achieve financial inclusivity. Emerging technologies (like artificial intelligence & machine learning, and deep learning) can play an important role in this through usage of alternative data. This is something that continues to be demonstrated by FinTech's using these technologies to facilitate faster, better and cheaper credit decisions. The use of these technologies and alternative data does bring additional risks of data security, privacy as well as ethical use. However, benefits in terms of accelerating financial inclusion outweigh the risks attached to them, and those risks can also be managed using proper technology and data governance frameworks. National Bank of Cambodia envisages that FinTech companies will play a leading role in supporting financial inclusivity agenda. Usage of Artificial Intelligence and Machine learning, coupled with alternative data by FinTech's and other financial institutions will surely help Cambodia accelerate the financial inclusion.

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