

BYGB 7988 Business Performance Management Risk Analytics

Section 2

Exam 3

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Question 1.

Underlying dynamics of the MFI sector in Myanmar:

- Microfinance Institutions (MFIs) provide main access to financial services in Myanmar, especially to marginalized groups (ex: 85% of clients being women)
- Steady growth of MFIs thanks to very low non-performing loan rate, and cultural intricacies rendered the population dependable for repaying loans ontime and in full

Challenges faced by MFI providers:

- Higher operating costs in smaller towns and villages due to lower population densities, and lack of reliable infrastructure and communication networks
- Local MFIs could only borrow from local banks, who demanded physical collateral like land to secure a loan. Foreign MFIs are barred from owning assets in Myanmar
- Lack of information sharing between MFIs to check the creditworthiness of borrowers and lack of a credit bureau resulted in discrepancy of reliable data
- High competition encouraged borrowers to take out multiple loans from multiple MFIs, resulting in over-indebtedness

(Q1)

Different types of analytics across the 4 types and 3 pillars that can assist MFIs:

- Apply predictive analytics to identify a clients propensity to default or pay on time
- Implement prescriptive analytics through unsupervised modeling to optimize the vetting process for every potential borrower, without needing every detail of their financial history
- Utilize natural language processing (NLP) to parse the tonation of clients' reason for borrowing or their past financial transactions to identify any risks of defaulting
- Apply descriptive analytics through unsupervised machine learning to examine data without fraud or uncover anomalies, patterns of interest, or potential risks
- Combine internal/external data by overlaying external map data on top of borrowing hotspots to visualize where there is a high default rate to mitigate the lack of shared information

Question 2.

Motorcycle loan model & risks:

- Daung created a rent-to-own model (RTO) for individuals to have access to a motorbike to commute to work, while paying off the loan monthly at low rates
 - Typically took 6 months to a year, and after the loan is fully repaid the ownership of the bike is transferred to the customer
 - Risk: how does Daung profit from this or what is there interest repayment

Loans to salaried workers

- For low-income workers, Daung made their product accessible to customers in partnership with the factory they worked by introducing a dynamic instead of fixed interest rate
 - Monthly payment amount for loan was deducted from the salary of the worker directly every month

Main credit risks

- Burden of default was placed on both Daung and the loan distributor (factory or motorbike dealer) and defaulting could be systemic due to unforeseen circumstances
 - Ex: political turmoil, natural disasters, bad weather, or livestock diseases

(Q2)

Analytical models for identifying and addressing the credit risks:

- Text Analytics: could identify defaults early, implementing NLP algorithms to identify names of past defaulters, borrowers with unstable incomes or those connected to high-risk people
- Homomorphic Encryption: Would enable dealers/factories to share data without exposing customer privacy, but providing the statistical insights for Daung to measure risk
- Risk Analytics: Apply unsupervised machine learning to examine borrowers who never defaulted or uncover repayment anomalies, inconsistency, or potential income loss
- Biometrics: measure and analyze unique physical and behavioural characteristics of each borrower to identify those who are high risk during the initiation process or for authenticating payments
- Unsupervised machine learning algorithms can uncover default schemes that would lead to greater debt if borrowers are receiving loans from multiple MFIs

Question 3.

Risks Daung should Consider:

Strategic risks:

- Daung's Model: scanning borrower's resident permit and thumbprint
 - Benefits: creates a database of borrowers that can be used for future lending opportunities if they have a dependable credit risk score
- Improvements: using competitive analytics and machine learning (random forest)
 - Benefits: utilize internal and external data for vetting borrowers, pulling data from dealers across the MFI into one central platform to analyze borrower's past work experiences and if they are outsourcing loans from other MFIs

Preventable risks:

- Daung's Model: tracking loan repayment history by submitting their installments in cash every month through a tablet app at dealer's location
 - Benefits: Dealer transfers the cash electronically to Daung's account to avoid risks from physical cash transfers, and makes dealer dependable

(Preventable Risks continued)

- Improvements: using predictive analytics to identify potential defaults
 - Benefits: train statistical models to identify high risk cases/clients automatically, and use microstrategy analytics to uncover repayment patterns and improve customer experience

Environmental Risks:

- Daung's Model: collaborated with well-known factories and used salary deduction model capped at 50% of worker's salary to lend money
 - Benefits: mitigated credit risk and guaranteed repayment thanks to factory partnership instead of depending on borrower to provide cash monthly
- Improvements: Use natural-language processing or geospatial analysis
 - Benefits: to track social media for suspicious activity from borrowers, threats of natural disasters, livestock diseases or other macroeconomic shifts that can cause mass defaults

Question 4.

How Daung can implement statistical & Machine-Learning capabilities in its credit risk assessment:

- Machine learning models can parse large datasets and spot patterns of default while monitoring repayments in real-time to identify gaps, issues and trends
- NLP algorithms can search for patterns or combinations among customer explanations for borrowing money or lack of payment to predict future behavior
- Social network analysis can uncover relations between borrowers, and statistically find the nature of the relations to uncover fraudulent crime networks
- Applying entity analytics using dealer/factory data or external sources such as social media and the internet to holistically regulate customers repayments and raise red flags earlier
- Visualization tools reveal trends and patterns by drilling down the root of the default, while allowing a story to emerge that Daung can see more clearly

Daung's New Loan Product for Farmers:

- Farmers can buy high-quality seeds at a low interest rate and repay through the rice mills using the salary deductions model similar with dealers/factories

Analytical Applications:

- Predictive modeling - machine learning, regression analysis, decisions trees, neural networks to classify borrower risk based on farmers past harvests and relationship with rice mill
 - Machine learning algorithms could also analyze historical and future market prices for crops based on weather patterns in real time
 - Introduce the tablet for automated cash payments between the rice mill and Daung to track customer transactions in a database for future analysis
- NLP algorithms can parse the internet and market fluctuations to identify off-peak times when prices are higher for farmers to sell harvests and guarantee greater returns
- Entity analytics to monitor transactions between rice mill and farmers to create a cross-disciplinary context to identify unusual repayment patterns and detect default early

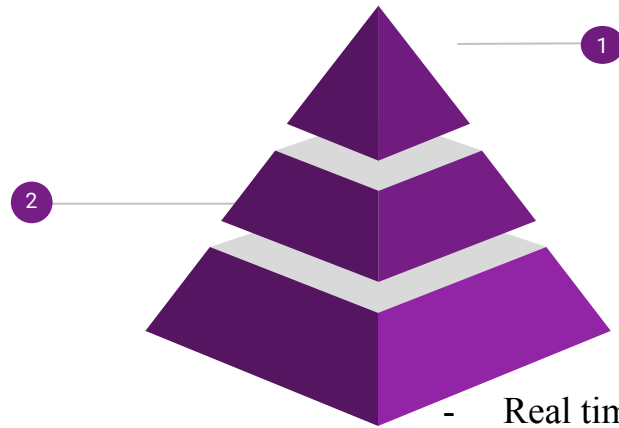
Question 5.

Daung Risk Management

Goal: mitigate the opportunity for borrowers to default, no matter if they are financing a motorbike, supplementing their income, or harvesting rice

Pillar Type: Visualization

Combine internal/external data by overlaying external map data on top of borrowing hotspots to visualize where there is a high default rate to mitigate the lack of shared information



Analytical Tool:

Apply machine learning models to parse historical transactions, analyze consequence of weather patterns, spot patterns of default, and monitor repayments in real-time to identify gaps, issues and trends

3 Benefits

- Real time analytics using human digital records can customize the loan experience for each borrower based on their situation, behaviors and risk profile
- Impoverished Burmese people can now travel to more job opportunities on motorbikes, expand their operating income, and gain more profits from their harvests to have extra money to invest elsewhere.
- Overall alleviating systemic poverty in Myanmar and providing greater access to financial services.

(Q5)

Example	Analytic Type	Pillar Type	How it Helps
Composing credit risk score for potential borrower who wants to rent a bike to transport to job	Risk Analytics	Statistical	Normalize the risk score accounting for external and internal factors. Identifying borrowers who never defaulted or uncovering repayment anomalies, inconsistency, or potential future income loss
A borrower is lagging on repayment and may be taking out loans from multiple MFIs	Descriptive analytics	Data Mining	Using unsupervised machine learning algorithms can uncover default schemes that would lead to greater debt if borrowers are receiving loans from multiple MFIs