

# Business Summary Report: Predictive Insights for Collections Strategy

## 1. Summary of Predictive Insights

Our analysis of customer financial data has uncovered key patterns and predictors of delinquency, providing actionable insights for an optimized collections strategy.

- **Top 3 Risk Factors:** The most significant indicators of delinquency risk are a **deteriorating payment history** (evidenced by recent 'Late' or 'Missed' payments), **high credit utilization** (using a large portion of available credit), and an **elevated debt-to-income ratio** (high debt burden relative to income).
- **High-Risk Customer Segments:** Customers exhibiting a recent increase in 'Late' payment statuses (particularly in the last few months) and those with consistently higher credit utilization and debt-to-income ratios represent segments with the highest delinquency risk. These patterns suggest growing financial strain and a reduced ability to meet obligations.
- **Model Findings:** Our predictive model, a Gradient Boosting Machine, is designed to leverage these intricate patterns. It can identify customers at risk with high precision, moving beyond traditional indicators to detect subtle behavioral shifts that precede delinquency.

## 2. Recommendation Framework

Based on these predictive insights, we propose a strategic intervention to proactively manage delinquency.

**Restated Insight:** Customers exhibiting a recent increase in 'Late' payment statuses are at a significantly higher risk of current delinquency, indicating a critical window for intervention.

**Proposed Recommendation:** To implement and deploy a Gradient Boosting Machine delinquency prediction model by Q4 2025, aiming to reduce the total value of new delinquent accounts by 10% within six months of deployment, while maintaining equitable outcomes across all customer segments.

- **Specific:** Implement a Gradient Boosting Machine model to identify customers at high risk of delinquency.
- **Measurable:** Reduce the total value of new delinquent accounts by 10% within six months post-deployment.
- **Actionable:** The model will enable targeted, proactive interventions (e.g., personalized financial counseling, modified payment plans, early collections outreach).
- **Relevant:** Directly aligns with Geldium's objective of minimizing financial losses and optimizing risk management.

- **Time-bound:** Model deployment by Q4 2025, with a measurable impact within six months thereafter.

**Justification and Business Rationale:** This recommendation directly addresses a core business objective: minimizing financial losses due to delinquency. The Gradient Boosting Machine model offers superior predictive accuracy, allowing Geldium to move from reactive collections to proactive risk management. By accurately pinpointing high-risk accounts early, we can optimize resource allocation, enhance customer retention through timely support, and ensure a healthier loan portfolio, thereby strengthening Geldium's financial stability and contributing to sustainable growth.

### 3. Ethical and Responsible AI Considerations

Reflecting on the fairness, transparency, and impact of our model and recommendation is crucial for responsible AI deployment.

- **Potential for bias or unfair treatment:** We recognize risks such as **Disparate Impact** (unequal outcomes for different groups) and **Disparate Performance** (unequal predictive accuracy across groups). Mitigation strategies include monitoring model performance across demographic segments using fairness metrics like Demographic Parity and Equalized Odds. Our data cleaning involved standardizing categories to reduce inherent data bias, and future steps will include algorithmic debiasing if significant disparities are detected.
- **Explainability:** Gradient Boosting Machines, while powerful, are less inherently transparent than simpler models. However, we plan to utilize post-hoc explainability techniques (e.g., SHAP values) to provide insights into *why* specific predictions are made, allowing for better understanding and auditability of key risk drivers.
- **Responsible financial decision-making:** The recommendation supports responsible financial decision-making by empowering proactive, data-driven interventions. The goal is to assist customers before they fall into deep delinquency, fostering better financial health for both clients and Geldium.
- **Other ethical principles considered:** We are committed to **transparency** in model monitoring, **accountability** for model performance and fairness, and strict adherence to **data privacy** regulations, ensuring customer data is handled securely and ethically throughout the model lifecycle. Human oversight will remain integral to critical decisions, especially concerning adverse actions.