Lending: Credit as a Product

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1 Lending: Credit as a Product

1.1 Introduction to Digital Lending

Digital lending platforms treat credit as a scalable, data-driven product rather than a manual banking service. These platforms automate the complete lending lifecycle using software systems, statistical modeling, and machine learning to enable faster credit decisions, lower operating costs, and improved risk management.

A digital lending system can be abstracted as a decision function:

$$\mathcal{L} : X \rightarrow \{Approval, Rejection\} \times R^{+}$$

where X denotes borrower features and the real-valued output represents loan pricing.

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1.2 Lending Product Types

- **Personal Loans**: Unsecured, fixed-tenure loans with higher credit risk
- **Buy Now Pay Later (BNPL)**: Short-term installment loans embedded at checkout
- **MSME Loans**: Working capital or term loans for small enterprises
- **Credit Cards**: Revolving credit with dynamic utilization
- **Microfinance**: Small-ticket loans aimed at financial inclusion

Each lending product differs in exposure size, tenure, repayment structure, and expected loss.

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1.3 Digital Lending System Architecture

1.3.1 High-Level Architecture

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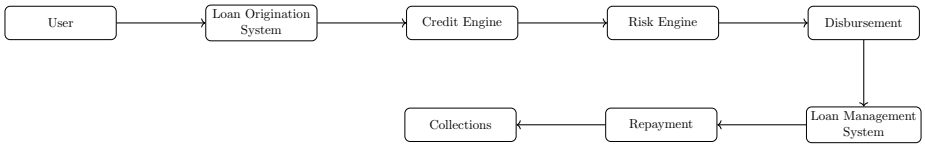

Figure 1: End-to-End Digital Lending Lifecycle

1.4 Lending Lifecycle (End-to-End)

1.4.1 Customer Acquisition

Borrowers are acquired through digital marketing, platform partnerships, and referrals. Acquisition efficiency is measured using:

$$CAC = \frac{Total\ Marketing\ Spend}{Number\ of\ Customers\ Acquired}$$

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1.4.2 Onboarding and KYC

Onboarding ensures identity verification, regulatory compliance, and eligibility validation. Failure at this stage increases funnel drop-off but reduces downstream fraud risk.

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1.4.3 Credit Underwriting

Credit underwriting estimates borrower risk using statistical models.

Probability of Default

$$PD = P(Default \mid X)$$

Using logistic regression:

$$PD = \frac{1}{1 + e^{-(\beta_0 + \beta^T X)}}$$

Borrowers are assigned to discrete risk buckets:

$$Bucket_i = \{PD \mid \tau_{i-1} \leq PD < \tau_i\}$$

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1.4.4 Risk Segmentation

Borrowers are segmented into low, medium, and high-risk cohorts to optimize approval thresholds and pricing strategies.

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1.4.5 Loan Pricing

Loan pricing compensates the lender for capital cost, credit risk, and operational margin.

$$Interest\ Rate = r_{base} + r_{risk} + r_{margin}$$

Where:

$$r_{risk} = f(PD, LGD)$$

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1.4.6 Expected Credit Loss

The fundamental lending risk equation is:

$$EL = PD \times LGD \times EAD$$

Where:

- LGD = Loss Given Default
- EAD = Exposure at Default

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1.4.7 Disbursement

Approved loans are disbursed via bank transfer or digital wallets. Disbursement marks the point at which capital is deployed and credit exposure begins.

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1.4.8 Repayment

Repayment schedules are defined by EMI structures:

$$EMI = \frac{P \cdot r \cdot (1+r)^n}{(1+r)^n - 1}$$

Where:

- P = principal
- r = periodic interest rate
- n = number of installments

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1.4.9 Collections and Recovery

Delinquent loans are handled through a staged collections strategy:

- Soft reminders
- Field collections
- Legal recovery

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1.5 Portfolio-Level Metrics

Approval Rate

$$Approval\ Rate = \frac{Approved\ Loans}{Total\ Applications}$$

Non-Performing Asset (NPA) Ratio

$$NPA = \frac{Outstanding\ Defaulted\ Loans}{Total\ Loan\ Portfolio}$$

Roll Rate

$$RR_{i \to j} = \frac{Loans_{i \to j}}{Loans_i}$$

Collection Efficiency

$$Collection\ Efficiency = \frac{Recovered\ Amount}{Total\ Amount\ Due}$$

Lifetime Value to CAC Ratio

$$\frac{LTV}{CAC} > 3 \quad (SustainableLending)$$

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1.6 Risk Types in Lending

- **Credit Risk**: Borrower inability or unwillingness to repay
- **Fraud Risk**: Identity, income, or synthetic fraud
- **Regulatory Risk**: Violations of lending guidelines
- **Liquidity Risk**: Capital shortages affecting disbursement

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1.7 Stress Testing and Portfolio Risk

Portfolio loss under stress scenarios is estimated as:

$$Loss_{portfolio} = \sum_{i=1}^{N} PD_i^{stress} \times LGD_i \times EAD_i$$

Stress testing evaluates resilience under macroeconomic shocks.

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1.8 Digital Lending Platforms

Modern lending platforms integrate real-time credit decisioning, automated servicing, and analytics-driven collections.

- LendingClub: Marketplace-based digital lending
- KreditBee: Consumer-focused instant lending platform

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1.9 Summary

Digital lending transforms credit into a scalable financial product by combining automation, data science, and risk modeling. The success of such systems depends on precise credit underwriting, disciplined risk management, and continuous portfolio monitoring.