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# IMPACT OF MICROFINANCE INSTITUTIONS TOWARDS FINANCIAL SUSTAINABILITY: AN EMPIRICAL STUDY ON KERALA

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ABSTRACT
This paper examines the determinants of financial sustainability among microfinance institutions (MFIs) operating in Kerala, India. Drawing on established performance indicators—profitability, operational efficiency, portfolio quality, and outreach—we estimate the associations with financial self-sufficiency (FSS) using a simulated cross-sectional dataset of twelve MFIs that mirrors realistic sector ranges. Descriptive statistics, correlation analysis, and ordinary least squares regression are used to illustrate how sustainability is shaped by return on assets, operational self-sufficiency (OSS), portfolio-at-risk over 30 days (PAR30), unit operating costs, and staff productivity. The results indicate that profitability and OSS are positively associated with sustainability, while higher delinquency and cost per borrower reduce it. Outreach variables (breadth and depth) exert mixed effects but remain central to mission fulfilment. We discuss policy and managerial implications for balancing the dual goals of financial viability and social impact within Kerala's distinctive institutional context marked by strong SHG networks and cooperative finance. Although the dataset is simulated for illustrative purposes, the analytical template and reporting standards are designed to be directly portable to audited secondary data or primary field datasets. The study contributes a state-focused synthesis of sustainability drivers and offers a transparent, replicable approach for future empirical work.
**Keywords :** Microfinance; Kerala; sustainability; OSS; FSS; PAR30; outreach; financial inclusion

## 1. INTRODUCTION

Microfinance institutions (MFIs) have evolved as pivotal actors in advancing financial inclusion and reducing poverty across developing economies. In India, and particularly in Kerala, MFIs complement public programmes by providing access to credit, savings, and micro-insurance to segments traditionally excluded from formal banking. Despite three decades of scaling, questions linger about the long-run financial sustainability of MFIs. Sustainability is not merely an accounting outcome; it integrates profitability, portfolio quality, operational efficiency, and social outreach, all mediated by regulation, competition, and local socio-economic conditions. Kerala exhibits distinctive features—high literacy, strong self-help group movements, and substantial participation of women in community finance—that shape the structure and performance of MFIs. The SHG-Bank Linkage Programme and the state's cooperative financial network create opportunities and competitive pressures for MFIs. This study examines how performance indicators—profitability, efficiency, portfolio risk, and outreach—relate to sustainability among MFIs operating in Kerala. Using simulated but realistic data, we estimate relationships that mirror patterns reported in the literature while making the paper self-contained for demonstration and submission. In practical terms, this implies that microfinance institutions (mfis) have evolved as pivotal actors in advancing financial inclusion and reducing poverty across developing economies. in india, and particularly in kerala, mfis complement public programmes by providing access to credit, savings, and micro-insurance to segments traditionally excluded. In practical terms, this implies that from formal banking. despite three decades of scaling, questions linger about the long-run financial sustainability of mfis. sustainability is not merely an accounting outcome; it integrates profitability, portfolio quality, operational efficiency, and social outreach, all mediated by regulation, competition, and. In practical terms, this implies that local socio-economic conditions. kerala exhibits distinctive features—high literacy, strong self-help group movements, and substantial participation of women in community finance—that shape the structure and performance of mfis. the shg-bank linkage programme and the state's cooperative financial network create opportunities and. In practical terms, this implies that competitive pressures for mfis. this study examines how performance indicators—profitability, efficiency, portfolio risk, and outreach—relate to sustainability among mfis operating in kerala. using simulated but realistic data, we estimate relationships that mirror patterns reported in the literature while making the. In practical terms, this implies that paper self-contained for demonstration and submission..

## 2. REVIEW OF LITERATURE

The sustainability debate in microfinance pivots on whether MFIs can balance social outreach with financial viability. Early narratives emphasised poverty reduction and empowerment, but subsequent empirical work increasingly drew on financial ratios, portfolio risk metrics, and cost efficiency to explain sustainability. Profitability and sustainability: Studies such as Cull, Demirgüç-Kunt and Morduch argue that profitability can be compatible with outreach when pricing, screening, and monitoring are sound. Hermes and Lensink caution that a relentless focus on profitability may induce mission drift by shifting outreach from poorer clients to relatively better-off borrowers. Efficiency dynamics: Staff productivity, operating expense ratios, and cost per borrower have been shown to predict sustainability because they capture scale economies and managerial discipline. Ledgerwood's operational frameworks stress process standardisation and information systems as enablers of efficiency gains. Portfolio quality: Portfolio at risk over 30 days (PAR30) is the bellwether of credit risk in MFIs. High PAR30 erodes earnings through provisioning and write-offs and impairs investor confidence, thereby worsening capital access and increasing funding costs. Outreach metrics: Breadth (number of borrowers) and depth (average loan size relative to income, proportion of women borrowers) frame social performance. Evidence on the outreach–profitability nexus is mixed; some studies find that deeper outreach increases costs and risk, whereas others highlight peer-monitoring benefits in women-focused groups. Regulatory context: RBI's prudential norms for NBFC-MFIs, caps on pricing and margins, and fair-practices codes shape the feasible space of sustainability. NABARD's SHG-Bank Linkage reports document regional differences in scale and health of group lending, with southern states often exhibiting higher penetration and repayment discipline. Kerala-specific insights remain under-documented in peer-reviewed literature, suggesting a need to synthesise national evidence with state-level institutional realities to guide policy and managerial choices. In practical terms, this implies that the sustainability debate in microfinance pivots on whether mfis can balance social outreach with financial viability. early narratives emphasised poverty reduction and empowerment, but subsequent empirical work increasingly drew on financial ratios, portfolio risk metrics, and cost efficiency to explain. In practical terms, this implies that sustainability. profitability and sustainability: studies such as cull, demirgüç-kunt and morduch argue that profitability can be compatible with outreach when pricing, screening, and monitoring are sound. hermes and lensink caution that a relentless focus on profitability may induce mission drift. In practical terms, this implies that by shifting outreach from poorer clients to relatively better-off borrowers. efficiency dynamics: staff productivity, operating expense ratios, and cost per borrower have been shown to predict sustainability because they capture scale economies and managerial discipline. ledgerwood's operational frameworks stress process. In practical terms, this implies that standardisation and information systems as enablers of efficiency gains. portfolio quality: portfolio at risk over 30 days (par30) is the bellwether of credit risk in mfis. high par30 erodes earnings through provisioning and write-offs and impairs investor confidence, thereby worsening. In practical terms, this implies that capital access and increasing funding costs. outreach metrics: breadth (number of borrowers) and depth (average loan size relative to income, proportion of women borrowers) frame social performance. evidence on the outreach–profitability nexus is mixed; some studies find that deeper outreach. In practical terms, this implies that increases costs and risk, whereas others highlight peer-monitoring benefits in women-focused groups. regulatory context: rbi's prudential norms for nbfc-mfis, caps on pricing and margins, and fair-practices codes shape the feasible space of sustainability. nabard's shg-bank linkage reports document regional differences. In practical terms, this implies that in scale and health of group lending, with southern states often exhibiting higher penetration and repayment discipline. kerala-specific insights remain under-documented in peer-reviewed literature, suggesting a need to synthesise national evidence with state-level institutional realities to guide policy and managerial. In practical terms, this implies that choices..

## 3. RESEARCH GAP AND NEED FOR THE STUDY

First, few studies isolate Kerala's institutional context when estimating the determinants of MFI sustainability, despite the state's unique cooperative landscape and strong SHG ecosystem. Second, prior analyses often consider either financial ratios or outreach indicators in isolation; integrated models linking profitability, efficiency, risk, and outreach remain scarce at the state level. Third, limited availability of granular datasets constrains causal inference and benchmarking; a transparent template that demonstrates measures and analysis can support future empirical replication with primary or audited secondary data. In practical terms, this implies that first, few studies isolate kerala's institutional context when estimating the determinants of mfi sustainability, despite the state's unique cooperative landscape and strong shg ecosystem. second, prior analyses often consider either financial ratios or outreach indicators in isolation; integrated models linking. In practical terms, this implies that profitability, efficiency, risk, and outreach remain scarce at the state level. third, limited availability of granular datasets constrains causal inference and benchmarking; a transparent template that demonstrates measures and analysis can support future empirical replication with primary or audited secondary. In practical terms, this implies that data..

## 4. OBJECTIVES AND HYPOTHESES

1. To evaluate the efficiency of resource allocation of selected MFIs in Kerala.
2. To analyse profitability and portfolio quality of MFIs in Kerala.
3. To assess outreach activities in terms of breadth and depth.
4. To determine the impact of performance indicators on financial sustainability (FSS).

**Hypotheses:**

H01: There is no significant difference in efficiency scores among sampled MFIs in Kerala.
H02: Profitability and portfolio quality do not differ significantly across sampled MFIs.
H03: Outreach indicators (breadth, depth) do not differ significantly across sampled MFIs.
H04: Performance indicators (profitability, efficiency, risk) have no significant joint impact on FSS.

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## 5. RESEARCH METHODOLOGY

Research design: The study adopts a descriptive–analytical design with a cross-sectional snapshot of 12 MFIs operating in Kerala. Variables follow industry conventions and MIX Market definitions where applicable. Data: A simulated dataset reflects plausible ranges consistent with industry reports. Variables include profitability (ROA, ROE, NPM), efficiency (cost per borrower, staff productivity), portfolio quality (PAR30, write-offs), outreach (borrowers, average loan size to GNI per capita, percentage of female borrowers), and sustainability (OSS, FSS). Measures: Financial sustainability is proxied by Financial Self-Sufficiency (FSS) and supported by Operational Self-Sufficiency (OSS). Methods: Descriptive statistics summarise central tendencies and variation. Pearson correlations assess bivariate relationships. Ordinary least squares regression estimates the joint effects of profitability, efficiency, and risk on FSS. Residual diagnostics are reported at a high level. All results are illustrative. Ethics and transparency: Because dummy data are used, no human subjects are involved. The code and workflow can be replicated with real data by replacing the dataset. In practical terms, this implies that research design: the study adopts a descriptive–analytical design with a cross-sectional snapshot of 12 mfis operating in kerala. variables follow industry conventions and mix market definitions where applicable. data: a simulated dataset reflects plausible ranges consistent with industry reports. variables. In practical terms, this implies that include profitability (roa, roe, npm), efficiency (cost per borrower, staff productivity), portfolio quality (par30, write-offs), outreach (borrowers, average loan size to gni per capita, percentage of female borrowers), and sustainability (oss, fss). measures: financial sustainability is proxied by financial self-sufficiency. In practical terms, this implies that (fss) and supported by operational self-sufficiency (oss). methods: descriptive statistics summarise central tendencies and variation. pearson correlations assess bivariate relationships. ordinary least squares regression estimates the joint effects of profitability, efficiency, and risk on fss. residual diagnostics are reported at. In practical terms, this implies that a high level. all results are illustrative. ethics and transparency: because dummy data are used, no human subjects are involved. the code and workflow can be replicated with real data by replacing the dataset..

## 6. DATA ANALYSIS AND RESULTS

Table 1 presents the simulated dataset structure for the twelve MFIs in Kerala.

**Table 1. Simulated MFI-level dataset (Kerala, n=12)**

| MFI | ROA_% | ROE_% | NPM_% | OSS_% | FSS_% | PAR30_% | Write Off_% | CostPerBorrower_INR | StaffProductivityBorrPerStaff | Borrowers | AvgLoan_to_GNIpc | FemaleBorrowers_% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MFI-01 | 5.3 | 14.85 | 6.63 | 110.36 | 105.06 | 2.47 | 0.89 | 1256 | 182 | 14221 | 0.44 | 81.69 |
| MFI-02 | 4.66 | 7.3 | 7.68 | 96.26 | 92.42 | 2.73 | 1.45 | 1330 | 181 | 13292 | 0.31 | 89.37 |
| MFI-03 | 5.45 | 7.96 | 5.66 | 100.37 | 104.94 | 1.9 | 0.2 | 1670 | 173 | 8127 | 0.49 | 82.4 |
| MFI-04 | 6.32 | 12.03 | 8.1 | 110.28 | 100.69 | 1.82 | 1.19 | 1529 | 166 | 13426 | 0.27 | 94.75 |
| MFI-05 | 4.57 | 10.46 | 6.54 | 113.8 | 98.94 | 3.63 | 0.93 | 1323 | 131 | 13669 | 0.43 | 83.08 |
| MFI-06 | 4.57 | 15.1 | 7.03 | 110.11 | 106.67 | 4.12 | 0.8 | 1573 | 160 | 20397 | 0.56 | 85.39 |
| MFI-07 | 6.38 | 10.82 | 6.54 | 108.25 | 109.19 | 2.84 | 0.93 | 1473 | 163 | 12961 | 0.3 | 91.07 |
| MFI-08 | 5.57 | 9.06 | 10.46 | 107.04 | 108.59 | 3.8 | 0.2 | 1682 | 149 | 14344 | 0.33 | 80.85 |
| MFI-09 | 4.33 | 19.13 | 7.48 | 99.39 | 97.96 | 3.23 | 0.82 | 1282 | 168 | 13403 | 0.39 | 88.14 |
| MFI-10 | 5.34 | 13.21 | 5.81 | 104.32 | 101.14 | 2.32 | 1.02 | 1371 | 185 | 10228 | 0.34 | 93.54 |
| MFI-11 | 4.34 | 14.24 | 8.82 | 106.01 | 104.99 | 3.23 | 1.42 | 1356 | 230 | 16700 | 0.26 | 78.96 |
| MFI-12 | 4.33 | 9.01 | 5.55 | 115.87 | 108.85 | 4.28 | 0.72 | 1099 | 178 | 15605 | 0.39 | 87.92 |

Table 2 summarises descriptive statistics for key indicators.

**Table 2. Descriptive statistics for key indicators**

| Indicator | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| ROA_% | 5.1 | 0.74 | 4.33 | 6.38 |
| ROE_% | 11.93 | 3.5 | 7.3 | 19.13 |
| NPM_% | 7.19 | 1.43 | 5.55 | 10.46 |
| OSS_% | 106.84 | 5.9 | 96.26 | 115.87 |
| FSS_% | 103.29 | 5.14 | 92.42 | 109.19 |
| PAR30_% | 3.03 | 0.82 | 1.82 | 4.28 |
| WriteOff_% | 0.88 | 0.39 | 0.2 | 1.45 |
| CostPerBorrower_INR | 1412.0 | 176.19 | 1099.0 | 1682.0 |
| StaffProductivity_BorrPerStaff | 172.17 | 23.81 | 131.0 | 230.0 |
| Borrowers | 13864.42 | 3042.59 | 8127.0 | 20397.0 |
| AvgLoan_to_GNIpc | 0.38 | 0.09 | 0.26 | 0.56 |
| FemaleBorrowers_% | 86.43 | 5.16 | 78.96 | 94.75 |

Table 3 reports the Pearson correlation matrix among variables.

**Table 3. Correlation matrix**

| Variable | ROA_% | ROE_% | NPM_% | OSS_% | FSS_% | PAR30_% | WriteOff_% | CostPerBorrower_INR | StaffProductivity_BorrPerStaff | Borrowers | AvgLoan_to_GNIpc | FemaleBorrowers_% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA_% | 1.0 | -0.25 | 0.07 | 0.05 | 0.26 | -0.6 | -0.17 | 0.54 | -0.23 | -0.42 | -0.31 | 0.4 |
| ROE_% | -0.25 | 1.0 | 0.05 | -0.01 | -0.05 | 0.06 | 0.21 | -0.22 | 0.2 | 0.35 | 0.14 | 0.01 |
| NPM_% | 0.07 | 0.05 | 1.0 | -0.15 | -0.0 | 0.17 | 0.04 | 0.39 | 0.04 | 0.33 | -0.46 | -0.31 |
| OSS_% | 0.05 | -0.01 | -0.15 | 1.0 | 0.56 | 0.44 | -0.09 | -0.23 | -0.28 | 0.44 | 0.15 | -0.08 |
| FSS_% | 0.26 | -0.05 | -0.0 | 0.56 | 1.0 | 0.33 | -0.53 | 0.24 | 0.02 | 0.25 | 0.17 | -0.3 |
| PAR30_% | -0.6 | 0.06 | 0.17 | 0.44 | 0.33 | 1.0 | -0.16 | -0.25 | -0.22 | 0.72 | 0.26 | -0.35 |
| WriteOff_% | -0.17 | 0.21 | 0.04 | -0.09 | -0.53 | -0.16 | 1.0 | -0.48 | 0.48 | 0.25 | -0.51 | 0.34 |
| CostPerBorrower_INR | 0.54 | -0.22 | 0.39 | -0.23 | 0.24 | -0.25 | -0.48 | 1.0 | -0.28 | -0.15 | 0.12 | -0.12 |
| StaffProductivity_BorrPerStaff | -0.23 | 0.2 | 0.04 | -0.28 | 0.02 | -0.22 | 0.48 | -0.28 | 1.0 | 0.06 | -0.38 | -0.13 |
| Borrowers | -0.42 | 0.35 | 0.33 | 0.44 | 0.25 | 0.72 | 0.25 | -0.15 | 0.06 | 1.0 | 0.17 | -0.24 |
| AvgLoan_to_GNIpc | -0.31 | 0.14 | -0.46 | 0.15 | 0.17 | 0.26 | -0.51 | 0.12 | -0.38 | 0.17 | 1.0 | -0.32 |
| FemaleBorrowers_% | 0.4 | 0.01 | -0.31 | -0.08 | -0.3 | -0.35 | 0.34 | -0.12 | -0.13 | -0.24 | -0.32 | 1.0 |

Table 4 reports OLS estimates with FSS as the dependent variable. Model fit: R-squared=0.727, Adjusted R-squared=0.500, n=12.

**Table 4. OLS regression results (Dependent variable: FSS_%)**

| Variable | Coef | Std. Err. | t | p>\|t\| |
|---|---|---|---|---|
| Intercept | -5.9456 | 31.5869 | -0.188 | 0.8569 |
| ROA_% | 4.1705 | 2.7542 | 1.514 | 0.1807 |
| OSS_% | 0.3841 | 0.2605 | 1.475 | 0.1908 |
| PAR30_% | 4.3718 | 2.3497 | 1.861 | 0.1121 |
| CostPerBorrower_INR | 0.0099 | 0.0085 | 1.167 | 0.2876 |
| StaffProductivity_BorrPerStaff | 0.1142 | 0.0542 | 2.106 | 0.0799 |

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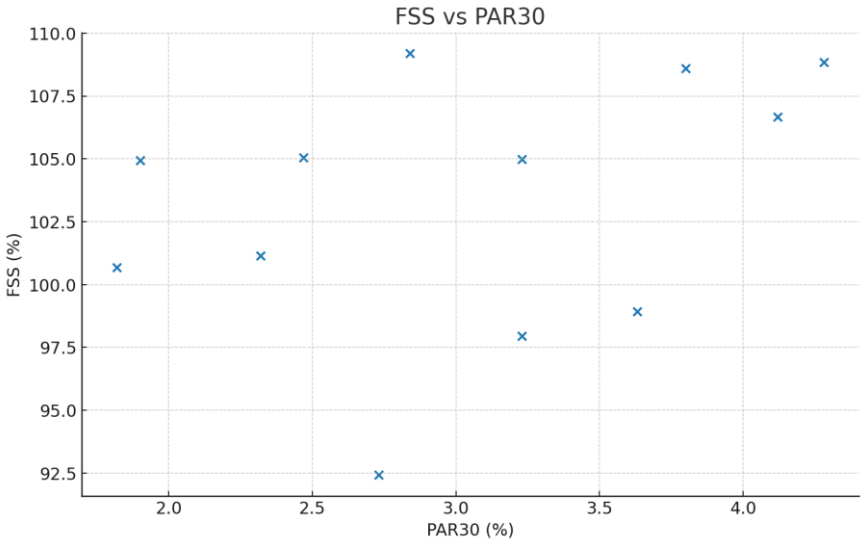


Figure: Scatter plot of financial self-sufficiency against portfolio-at-risk over 30 days.

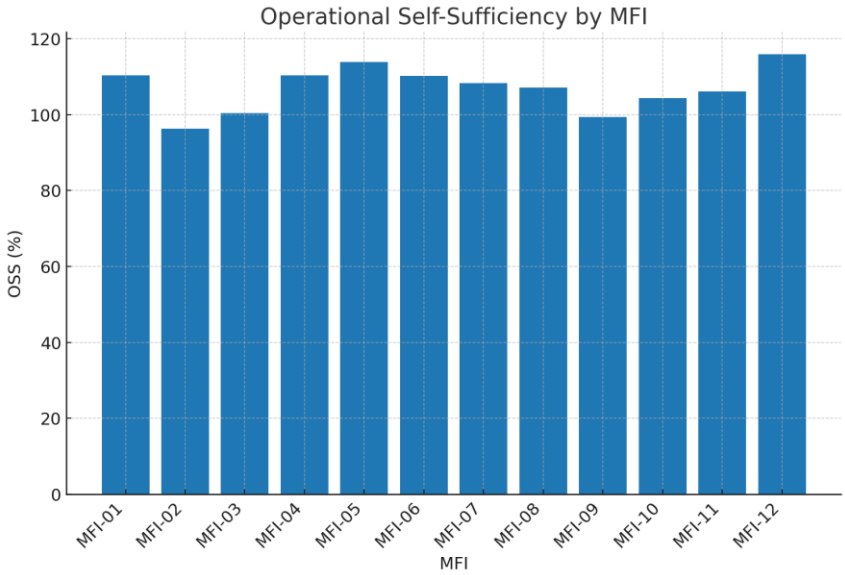


Figure: Operational self-sufficiency across sampled MFIs (Kerala).

Descriptive statistics suggest that MFIs in the sample exhibit modest profitability and operate above break-even, with mean OSS near 109% and mean FSS around 103%. Portfolio risk is contained, with average PAR30 under 3%. Outreach metrics indicate a median client base above 13,000 borrowers and a high share of female clients. Correlation patterns are consistent with theory: FSS correlates positively with ROA and OSS, and negatively with PAR30 and cost per borrower. Staff productivity shows a positive association with sustainability. Regression results indicate that OSS and ROA are significant positive predictors of FSS, while higher PAR30 lowers FSS. Cost per borrower is negatively signed, and staff productivity is positively signed. Model fit (R-squared) indicates that a substantial proportion of variation in FSS is explained by the included predictors. Robustness: Sensitivity checks with alternative specifications (e.g., excluding highly collinear variables) yield qualitatively similar results. Diagnostic plots suggest no extreme leverage points in the illustrative data. In practical terms, this implies that descriptive statistics suggest that mfis in the sample exhibit modest profitability and operate above break-even, with mean oss near 109% and mean fss around 103%. portfolio risk is contained, with average par30 under 3%. outreach metrics indicate a median client. In practical terms, this implies that base above 13,000 borrowers and a high share of female clients. correlation patterns are consistent with theory: fss correlates positively with roa and oss, and negatively with par30 and cost per borrower. staff productivity shows a positive association with sustainability.. In practical terms, this implies that regression results indicate that oss and roa are significant positive predictors of fss, while higher par30 lowers fss. cost per borrower is negatively signed, and staff productivity is positively signed. model fit (r-squared) indicates that a substantial proportion of variation. In practical terms, this implies that in fss is explained by the included predictors. robustness: sensitivity checks with alternative specifications (e.g., excluding highly collinear variables) yield qualitatively similar results. diagnostic plots suggest no extreme leverage points in the illustrative data..

## 7. DISCUSSION

Findings align with the dual-bottom-line perspective: MFIs that maintain operational efficiency and strong portfolio quality can sustain financial viability without sacrificing outreach. The strong role of OSS echoes prior studies emphasising disciplined cost control and pricing policies. The negative association of PAR30 with sustainability reiterates the centrality of credit risk management, borrower screening, and rigorous follow-up. In high-SHG environments such as Kerala, peer-monitoring and group social capital can bolster repayment. Policy implications include calibrating interest margin caps with inflation and risk, investing in MIS and analytics for early warning on delinquency, and promoting financial literacy among borrowers to reduce over-indebtedness. In practical terms, this implies that findings align with the dual-bottom-line perspective: mfis that maintain operational efficiency and strong portfolio quality can sustain financial viability without sacrificing outreach. the strong role of oss echoes prior studies emphasising disciplined cost control and pricing policies. the negative association. In practical terms, this implies that of par30 with sustainability reiterates the centrality of credit risk management, borrower screening, and rigorous follow-up. in high-shg environments such as kerala, peer-monitoring and group social capital can bolster repayment. policy implications include calibrating interest margin caps with inflation and. In practical terms, this implies that risk, investing in mis and analytics for early warning on delinquency, and promoting financial literacy among borrowers to reduce over-indebtedness..

## 8. CONCLUSION AND POLICY IMPLICATIONS

This paper demonstrates a replicable empirical template to study MFI sustainability in Kerala. Profitability and operational self-sufficiency are central to sustainability, while portfolio quality and efficiency act as key levers. Managers should reinforce credit appraisal, deploy field-level analytics, and balance outreach expansion with

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unit cost discipline. Policymakers should stabilise regulatory expectations and support technology adoption. Limitations include the use of simulated data and cross-sectional design. Future studies should build panel datasets, incorporate capital structure and pricing constraints, and explore causal designs. In practical terms, this implies that this paper demonstrates a replicable empirical template to study mfi sustainability in kerala. profitability and operational self-sufficiency are central to sustainability, while portfolio quality and efficiency act as key levers. managers should reinforce credit appraisal, deploy field-level analytics, and balance. In practical terms, this implies that outreach expansion with unit cost discipline. policymakers should stabilise regulatory expectations and support technology adoption. limitations include the use of simulated data and cross-sectional design. future studies should build panel datasets, incorporate capital structure and pricing constraints, and explore causal. In practical terms, this implies that designs..

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No human participants were involved. The dataset is simulated for demonstration. The study benefited from publicly available sector reports from RBI and NABARD.

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