



FINANCIAL SELF-SUFFICIENCY IN MICROFINANCE INSTITUTIONS:
A COMPLEXITY THEORY LENS USING FUZZY-SET QUALITATIVE COMPARATIVE
ANALYSIS

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Abstract

Financial self-sufficiency is a complex phenomenon arising from the interplay of multiple factors rather than any single factor, in the context of complexity theory. The fuzzy-set Qualitative Comparative Analysis, an asymmetric technique, is specifically designed to analyse the interplay of multiple factors simultaneously through a configurational approach. The study's input conditions are the depth of outreach, portfolio at risk, management inefficiency, active borrowers, capital structure at the institutional level, and human development at the country level. At the same time, the outcome is the financial self-sufficiency of microfinance institutions of 102 countries around the globe. The study retrieved publicly available samples from the World Bank's Mix Market database of 1295 microfinance institutions, comprising 14245 observations, covering the period 2009-2019. For comparative analysis, using the software for Fuzzy-set Qualitative Comparative Analysis, the study examines the joint interplay of input conditions and outcomes for the years 2009, 2014, and 2019. The 2019 configurations show a balanced interaction between institutional capabilities and favourable human and economic development conditions, while development conditions and operational efficiency mainly influence the 2009 configurations. The 2014 configurations place more emphasis on outreach and portfolio quality. The longitudinal comparison also shows growing configurational complexity, with active borrowers and management effectiveness remaining significant across all years, while portfolio quality gradually gains prominence over time. The study offers useful implications for MFI managers and policymakers by emphasizing the necessity of context-specific strategies that strengthen portfolio quality, managerial efficiency, borrower outreach, capital structure, and supportive development environments to ensure long-term financial sustainability.

Keywords: Financial Self-sufficiency, Microfinance Institutions, FsQCA, Complexity Theory

1. Introduction

Microfinance institutions (MFIs) play a pivotal role in expanding financial inclusion by providing financial services to low-income, financially excluded populations worldwide (Armendáriz & Morduch, 2010). By providing financial services such as microcredit, savings, and insurance, MFIs can contribute to poverty alleviation, income generation, and socioeconomic development (Ledgerwood et al., 2013). Financial sustainability of MFIs has been a major concern for practitioners, scholars, and policymakers (Cull et al., 2009). On the one hand, financially sustainable MFIs can expand their outreach and thus serve disadvantaged



populations on a long-term basis. On the other hand, financial sustainability can also reduce the dependence of MFIs on grant and government funding (Vicki L. Bogan, 2012).

On this basis, financial self-sufficiency (FSS) has been considered an important metric of MFIs' financial sustainability, as it captures the extent to which MFI can cover the operational and financial costs of running a business through internally generated revenues (Mersland & Strøm, 2010). High FSS of MFIs can enhance the outreach, increase institutional stability and ensure the continuity of the service delivery (Quayes, 2012). However, in practice, most MFIs struggled with issues related to achieving and sustaining FSS (Vicki L. Bogan, 2012; Tehulu, 2013).

Previous studies have identified several organizational factors that influence the financial performance and sustainability of MFIs. Among these factors, outreach has received considerable attention because it reflects the extent to which MFIs serve financially excluded populations (Hermes et al., 2011). Outreach is commonly measured through depth of outreach (DOTR), which captures the extent of service to poorer clients. Portfolio quality, represented by portfolio at risk (PAR), is another critical determinant because deteriorating loan portfolios increase default risk and threaten financial viability (Ayayi & Sene, 2010). Active borrowers (ATB) represent the scale of lending operations and constitute an important source of revenue generation, while capital structure (CS) influences the availability and cost of financial resources required to sustain operations (Vicki L Bogan, 2012) (Tchuigoua, 2014). In addition to organizational characteristics, the broader socioeconomic environment may influence the ability of MFIs to achieve financial self-sufficiency. Human development (HDV), reflected in education, health, and living standards, can enhance borrowers' repayment capacity and improve the effectiveness of microfinance programs (Klugman et al., 2011; Sen, 1999).

Consequently, both organizational and environmental factors are likely to interact in shaping the sustainability outcomes of MFIs. Moreover, the unique contributions of variables combinations cannot be identified due to the underlying assumptions of linear and symmetric relationships implicit in regression analysis. For example, FSS is a conjunctural phenomenon in which combinations of variables lead to the outcome; distinct combinations of variables may lead to the same outcome (equifinality), and the cause of the presence of an outcome and its absence are not necessarily the same (causal asymmetry) (Woodside, 2013).

To this end, this study uses fuzzy-set qualitative comparative analysis (fsQCA) to make a unique contribution to this literature by examining the role of these factors in leading to FSS in MFIs. In doing so, this study draws on well-established theoretical perspectives to conceptualize how various combinations of antecedent conditions lead to FSS, including complexity theory. The study provides empirical evidence on the drivers of FSS in MFIs: depth of outreach, portfolio at risk, management inefficiency, active borrowers, capital structure, and human development. Specifically, the findings demonstrate the importance of capital structure in FSS. This is consistent with a few other studies (Tehulu, 2013), but a new lens on MFIs. This is important as it sheds light on the relationship between capital structure and FSS in the context of MFIs. Thus, the study finds that MFIs with one or more of the following configurations of antecedent conditions, namely carefully selected borrowers, good capital structure, and good portfolio management, achieve FSS. In short, the approaches used in this body of research need to be broadened to account for the role of variable configurations in MFIs.

1.1 Research Objectives

- a. To assess the role of human development as a contextual condition influencing configurations (Portfolio at risk, Management inefficiency, Depth of outreach, Active borrower, Capital structure) leading to financial sustainability.
- b. To derive policy implications for improving the financial sustainability of microfinance institutions based on the configurational effects of Human and economic conditions.

2. Literature Review

Financial self-sufficiency (FSS) is a multifaceted outcome determined by a single cause rather than by the interaction of multiple operational and organizational factors. Previous research indicates that the financial sustainability of microfinance institutions (MFIs) is influenced by a several factors, including



borrower engagement, capital structure, outreach tactics, portfolio quality, and managerial effectiveness. To explain variations in FSS, it is essential to comprehend how these factors interact. The depth of outreach (DOTR) presents a more complex relationship with FSS. Serving poor clients sometimes requires smaller loans and greater monitoring fees, (Cull, Demirgu" ç-Kunt, et al., 2007; Hermes et al., 2011) which may result in a trade-off between social outreach and financial viability. However, via innovative lending techniques, efficient operations, and strong payback performance, MFIs can concurrently accomplish deep outreach and financial sustainability (Louis et al., 2013). Therefore, DOTR may have a favorable or unfavorable effect on FSS depending on how it interacts with other institutional elements.

Portfolio at Risk (PAR) is generally seen as a negative driver of FSS since high loan delinquency levels reduce interest revenue, increase provisioning costs, and harm financial performance (Beg, 2016; Tehulu, 2013). However, the negative effects of PAR might be mitigated if MFIs maintain efficient management practices and a substantial borrower base that can generate enough revenue to cover credit losses. Therefore, the relationship between PAR and FSS is often determined by the existence of complementing organizational capacities.

FSS is also negatively affected by management inefficiency (MIN), which increases operating expenses and decreases the effectiveness of resource use. According to and (Tehulu, 2013), ineffective institutions may struggle to monitor loans, manage costs, and uphold service quality, which could ultimately jeopardize financial viability. However, some MFIs may be able to counteract the detrimental effects of inefficiency by expanding their clientele, improving their funding arrangements, or strengthening their outreach.

It is generally expected that capital structure (CS) will improve FSS by providing MFIs the financial resources required for risk management, expansion, and operational continuity. According to (Dabi et al., 2023; Kyereboah-Coleman, 2007), a balanced funding structure enables banks to boost lending activity, utilize external resources, and improve financial performance. However, if not properly managed, an over-reliance on debt may lead to increased financial commitments and negatively impact sustainability.

According to (De Crombrughe et al., 2008; Mersland & Øystein Strøm, 2009), active borrowers (ATB) are often positively correlated with FSS because a larger borrower base enables MFIs to benefit from economies of scale and distribute operating costs among more clients. Increased revenue production and improved institutional efficiency can be achieved by having more active borrowers. Rapid borrower growth, however, may also put a burden on monitoring systems and administrative capabilities, thereby increasing default risk and decreasing sustainability (Nyamsogoro, 2010).

Overall, research indicates that PAR, MIN, DOTR, CS, and ATB have interdependent rather than independent impacts on FSS. These conditions combine to produce financial self-sufficiency, where the presence or absence of one aspect may amplify, mitigate, or offset the consequences of another. The theoretical underpinning for investigating several routes to financial sustainability using fsQCA is provided by this configurational perspective.

2.1 Propositions

P₁: Portfolio quality, management efficiency, Depth of outreach, borrower participation, and capital structure jointly influence the financial self-sufficiency of microfinance institutions.

P₂: Human development (HDV) act as contextual conditions that shape pathways leading to financial self-sufficiency.

2.2 Theoretical Framework

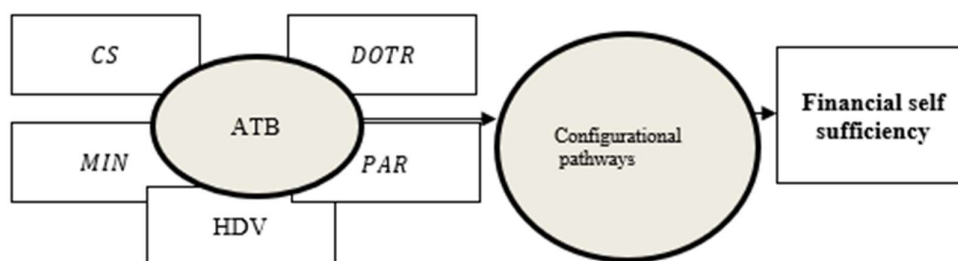
2.2.1 Complexity Theory. Complexity Theory claims that organizational outcomes depend on the interactions of multiple conditions rather than on a single factor. Even though outcomes of organization are mediated by multiple causes rather than a single cause, research on this topic remains insufficient. This article focuses on three core principles of Complexity Theory, namely, conjunctural causation, equifinality, and causal asymmetry, and analyzes their application to complexity theory in microfinance institutions (MFIs). According to this theory, organizations exist in complex systems in which multiple elements coexist. Therefore, it is assumed that these elements, both internal and external, interact with each other and with



external events simultaneously to produce desired or undesired performance outcomes. The application of these principles of Complexity Theory suggests that no single factor alone determines the Financial Self-Sufficiency (FSS) level of MFIs. However, a combination of organizational and environmental factors can produce it. These conditions might include active borrowers, capital structure, portfolio quality, management efficiency, outreach, and human development.

Figure 1

Configurational Model



3 Data and Methodology

3.1 Data

The study utilizes balanced panel dataset obtained from the Microfinance Information Exchange (MIX) database. The dataset comprises country–MFI–year observations covering 1,295 Microfinance Institutions (MFIs) operating across 102 countries for the year of 2009 to 2019. Each observation represents an individual MFI operating within a specific country in a particular year.

3.2 Input variables

In keeping with previous research on microfinance sustainability, this study uses a single outcome variable and a set of organizational and contextual criteria. Table 1 compiles the variables utilized in the investigation along with their operationalization and measurement standards. Outreach, portfolio quality, management efficacy, borrower base, capital structure, and development indicator are considered causal factors, while financial sustainability is the outcome variable. These metrics were created using well-known variables that are frequently used in the microfinance literature in order to ensure the validity and comparability of the analysis.

Table 1

Variables, Measurements, and Data Sources

Variable		Measurement	Reference
Outcome Variable			
Financial (FSS)	Self-Sufficiency	Operating Income / (Financial Expense + Operating Expense + Loan Loss Provision)	(Marwa & Aziakpono, 2015)
Input variables			
Depth of Outreach (DOTR)		Adjusted Average Loan Balance per Borrower / GNI per Capita	(Aslam et al., 2019; Awaworyi Churchill, 2020; Cull, Demirgüç-Kunt, et al., 2007)
Portfolio Quality Proxy (Portfolio at Risk (PAR))		Proportion of loans overdue by more than 30 days to the total loan portfolio	(Githaiga & Bitok, 2023)
Management (MIN)	Inefficiency	Ratio of Operating Expenses to Total Assets	(Khan et al., 2017)



Active Borrowers (ATB)	Number of individuals with an outstanding loan balance	(Memon et al., 2022)
Capital Structure (CS)	Ratio of Total Equity to Total Assets	(Singh, 2024)
Human Development (HDV)	Overall Human Development Index (HDI) Score	(Ashraf et al., 2022)

3.3 Method

The study makes use of an balanced panel dataset of microfinance institutions from 2009 to 2019 that is taken from the MIX Market database. The MIX Market database is used to gather institutional and financial data for MFIs, while globally known secondary sources are used to gather contextual variables at the macro level.

This study uses the fsQCA software, created by Charles C. Ragin, for the empirical analysis. The raw data were first calibrated into fuzzy-set membership scores that ranged from 0 (full non-membership) to 1 (complete membership) using the usual fsQCA process. Three qualitative anchors—full membership (0.95), the crossover point (0.50), and full non-membership (0.05) are needed to perform the calibration using the direct method suggested by Ragin (2008). To guarantee meaningful set membership, these calibration limits are established based on theoretical underpinnings and earlier empirical research.

A Necessary Condition Analysis (NCA) is carried out following calibration to ascertain whether any specific condition is required to achieve high financial sustainability. A consistency threshold of 0.90 is utilized to determine the necessary requirements after consistency and coverage data are analyzed. The analysis moved on to the sufficiency step since no single condition met the necessary level.

The calibrated data is then used to create a truth table that listed every logical combination of causative conditions. A frequency criterion of 9 and a consistency threshold of 0.81 are used in accordance with published fsQCA standards to separate experimentally meaningful configurations from less representative combinations. The intermediate solution, which takes into account theoretical predictions regarding the direction of causal linkages, is used to minimize logical remainders.

In order to determine the organizational and contextual conditions that are adequate for attaining high financial sustainability, a Sufficiency Condition Analysis is carried out. The generated configurations are assessed using solution coverage and consistency, which show each causal pathway's empirical relevance and dependability. In order to demonstrate the financial sustainability of microfinance organizations, the fsQCA results show the concepts of equifinality and causal complexity by offering several different configurations that result in the same outcome (Fiss, 2011; Ragin, 2009).

3.3.1 Calibration. Three qualitative anchors indicating full membership (0.95), the crossover point (0.50), and full non-membership (0.05) are used to calibrate all variables into fuzzy sets in accordance with Charles C. Ragin's guidelines. The empirical distribution of the data, known microfinance benchmarks, and theoretical concerns are taken into account while choosing calibration levels. Calibration was reversed to represent participation in the set of well-performing institutions for variables like portfolio at risk and managerial inefficiency, where lower values indicate greater performance.

Table 2

Calibration

Variables	Full mbr (0.95)	Crossover 0.50	Non mbr 0.05 anchor	Reference
FSS	1.1	1	.9	(Mersland & Øystein Strøm, 2009)
DOTR	1.50	0.50	0.10	(Ledgerwood et al., 2013)
PAR	0.01	0.05	0.15	(Rosenberg, 2009)
MIN	0.05	0.15	0.35	(Cull et al., 2011)
ATB	15000	2000	100	(Cull, Demirgüç-Kunt, et al., 2007)
CS	1.50	0.50	0.10	(Hartarska & Nadolnyak, 2007)



HDV	0.80	0.70	0.55	(Ahlin et al., 2011)
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3.3.2 Necessary Condition Analysis. The necessary condition analysis is conducted to determine whether attaining high financial self-sufficiency (FSS) requires any particular condition. The analysis was carried out before the sufficiency analysis, in accordance with the suggestions of (Ragin, 2009; Schneider & Wagemann, 2012). When a condition's consistency value exceeded the suggested cutoff of 0.90, it was deemed required. To evaluate the empirical significance of the necessary conditions, coverage values were also examined. Conditions with consistency values below 0.90 were not considered necessary for achieving financial sustainability. None of the individual conditions met the suggested consistency level of 0.90, as indicated by the requisite condition analysis results. As a result, it is impossible to identify a single prerequisite for financial sustainability. This result supports the configurational logic of fsQCA by indicating that financial sustainability results from particular combinations of organizational and contextual factors rather than from a single antecedent situation. (Ragin, 2009; Schneider & Wagemann, 2012; Ullah et al., 2023).

Table 3

Necessary condition analysis

Condition	Consistency	Coverage
DOTR	0.404	0.661
~DOTR	0.320	0.507
PAR	0.086	0.670
~PAR	0.962	0.633
MIN	0.451	0.617
~MIN	0.887	0.658
CS	0.341	0.728
~CS	0.771	0.653
HDV	0.587	0.708
~HDV	0.499	0.609
ATB	0.459	0.942
~ATB	0.426	0.864

3.4 Sufficiency Analysis

In order to determine the combinations of causal conditions associated with high financial self-sufficiency (FSS) among microfinance institutions (MFIs), a sufficiency analysis using fuzzy-set Qualitative Comparative Analysis (fsQCA) was conducted after calibration of variables and evaluation of necessary conditions. By acknowledging the concepts of conjuncture causation and equifinality, fsQCA analyzes how various conditions combine to produce an outcome, in contrast to traditional statistical methods that concentrate on the net effect of individual variables (Ragin, 2009). The calibrated data were used to create a truth table, and empirically relevant configurations were identified by applying consistency and frequency standards. Alternative combinations of outreach, risk, efficiency, capital structure, and contextual development conditions are revealed by the intermediate solutions that follow. These environmental elements collectively contribute to the sustainability of MFIs. Sufficiency Analysis

3.4.1 Truth Table Construction. A truth table was created utilizing a frequency threshold of 9 and a consistency threshold of 0.81 following the completion of the required condition analysis. For logical minimization and sufficiency analysis, only configurations that met these requirements were kept. This process made it possible to find empirically significant combinations of factors related to financial sustainability. (Ragin, 2009; Schneider & Wagemann, 2012)



Table 4

Truth Table for DOTR -HDV Model

DOTR1	PAR1	MIN1	ATB1	CS1	HDV1	number	FSS2	raw consist.	PRI consist.	SYM consist
0	1	0	1	1	1	11	1	0.874	0.792	0.793
0	1	0	1	0	1	49	1	0.859	0.790	0.793
0	1	0	1	0	0	27	1	0.851	0.777	0.778
1	1	0	1	0	0	33	1	0.848	0.764	0.768
1	1	0	0	1	1	12	1	0.831	0.709	0.711
1	1	0	1	0	1	34	1	0.830	0.742	0.743
0	1	1	1	0	1	32	1	0.821	0.721	0.723
0	0	1	1	1	0	12	1	0.819	0.680	0.681
0	0	0	1	0	1	30	1	0.815	0.710	0.711
0	0	0	1	0	0	45	1	0.815	0.713	0.718
0	1	0	0	1	1	9	0	0.806	0.677	0.677
1	0	1	1	0	0	10	0	0.802	0.643	0.643
1	1	0	0	0	0	11	0	0.798	0.655	0.656
1	1	1	0	1	1	11	0	0.796	0.636	0.636
0	1	1	1	0	0	42	0	0.794	0.682	0.684
1	1	0	0	0	1	30	0	0.791	0.680	0.684
1	0	0	1	0	0	55	0	0.790	0.671	0.676
0	0	1	1	0	1	12	0	0.789	0.650	0.651
1	1	1	1	0	1	14	0	0.785	0.640	0.644
0	0	1	1	0	0	47	0	0.782	0.654	0.657
0	1	0	0	0	0	18	0	0.779	0.641	0.642
0	1	1	0	1	0	13	0	0.773	0.611	0.611
0	1	0	0	0	1	81	0	0.768	0.664	0.673
1	0	0	1	0	1	31	0	0.768	0.628	0.628
0	1	1	0	1	1	13	0	0.764	0.603	0.603
0	0	0	0	0	0	10	0	0.761	0.593	0.596
1	0	1	1	0	1	13	0	0.758	0.584	0.585
1	0	1	0	1	1	9	0	0.758	0.574	0.574
0	1	1	0	0	1	23	0	0.742	0.591	0.592
0	0	1	0	1	1	11	0	0.741	0.549	0.550
0	0	0	0	0	1	26	0	0.741	0.600	0.600
0	0	1	0	1	0	33	0	0.739	0.564	0.565
1	0	0	0	0	1	16	0	0.729	0.561	0.562
1	1	1	0	0	1	17	0	0.728	0.548	0.548
0	0	1	0	0	1	19	0	0.723	0.554	0.556
1	0	1	0	0	1	26	0	0.721	0.553	0.553
0	1	1	0	0	0	39	0	0.713	0.547	0.552
1	0	0	0	0	0	14	0	0.713	0.508	0.508
0	0	1	0	0	0	27	0	0.699	0.517	0.517

The truth table analysis shows that a variety of organizational and contextual circumstances, rather than just one, have an impact on financial sustainability (FSS) in microfinance firms. Outreach , portfolio at risk (PAR), management inefficiency (MIN), active borrowers (ATB), capital structure (CS), and development indicators(HDV) all show varying degrees of consistency and regularity in yielding the result.The existence of several empirically significant configurations supports the idea of equifinality,



indicating that MFIs can achieve financial sustainability in various ways. Configurations that met the predefined frequency and consistency standards were retained for further analysis, providing the basis for identifying suitable combinations of circumstances associated with high financial self-sufficiency. This finding emphasizes the complexity of MFI sustainability and emphasizes the significance of analyzing the interaction of multiple factors rather than relying on isolated determinants.

The suitable condition analysis employed fuzzy-set qualitative comparative analysis (fsQCA) to identify the combinations of causal circumstances associated with high financial sustainability (FSS) among microfinance institutions (MFIs). Unlike conventional statistical techniques that estimate the independent net effects of variables, fsQCA examines how multiple circumstances interact and combine to produce a specific outcome (Ragin, 2009)

Because it acknowledges that outcomes may arise from numerous different pathways a concept known as equifinality the approach is especially well suited for examining causal complexity (Fiss, 2011; Schneider & Wagemann, 2012). As a result, rather than being influenced by a single cause, financial sustainability is seen as the result of many combinations of organizational and environmental factors. collaborate to produce long-term financial success for MFIs.

The main goal of creating a truth table is to identify the exact combinations of criteria in the cases that are looked at that result in the desired outcome. According to (Ragin, 2009) the truth table has rows that match 2^n , where n is the number of situations being looked at. All potential combinations of conditions are shown, along with relevant outcomes.

The current study examined several possible combinations and then created a truth table to show the results of the scenarios and instances that were examined. In fsQCA analysis, combinations with a consistency score less than 0.81 are usually excluded, according to (Schneider & Wagemann, 2012) After that, combinations that don't meet these criteria are removed from the truth table through a refinement process.

Boolean algebra and algorithms are used in the fsQCA technique to make it easier to logically reduce a number of arbitrary criteria. The result is a set of configurations related to the effect (Fiss, 2011). Several possible responses are generated by the truth table generation technique, and the results are then evaluated through contrasting analysis. (Ragin, 2009)

3.4.2 Sufficient Condition Analysis. The 2009 fsQCA results shown in table 5 support the equifinality principle by showing that numerous configurational pathways, rather than a single factor, are used to attain financial sustainability among microfinance organizations. The most important factors linked to financial sustainability in the Human Development (HDV) model is a higher number of active borrowers (ATB), an appropriate capital structure (CS), and the lack of managerial inefficiency (~MIN).

Overall, the 2009 results indicate that contextual development variables alone are not as important for attaining financial sustainability as internal institutional elements, especially managerial effectiveness, outreach through engaged borrowers, and capital structure.

The 2014 fsQCA results display in table 5 shows the equifinality concept by showing that microfinance organizations can achieve financial sustainability through a variety of alternative configurations. Internal institutional factors continued to have a greater impact than contextual factors in DOTR-HDV model. Specifically, the most common factors linked to financial sustainability were portfolio quality, active borrowers, and management efficiency (low management inefficiency).

This implies that in 2014, sustainable microfinance activities were supported more successfully by human development conditions. Additionally, all HDV designs showed a consistent lack of management inefficiencies, underscoring the vital significance of effective management techniques. Overall, the 2014 results show that excellent portfolio performance, effective management, and significant outreach through active borrowers are characteristics of financially sustainable microfinance firms. In 2014, human development emerged as the more significant contextual factor, offering a stronger configurational pathway toward financial sustainability. These results highlight the fact that institutional capacities and favorable developmental environments interact to generate sustainability rather than a single element.



The adequate configurations that result in high financial sustainability are shown in Table 5 together with the coverage and consistency values that go along with them. The identified configurations shed light on the ways in which capital structure, active borrowers, portfolio risk, outreach scope, and management effectiveness interact to produce sustainable financial success among MFIs.

The 2019 results show eight different configurations that result in high financial sustainability are identified by the fsQCA results. The most prevalent conditions throughout these paths are portfolio quality (PAR), management efficiency (~MIN), active borrowers (ATB), and human development (HDV). Effective portfolio management and a robust borrower base are characteristics of financially viable MFIs, as Configuration 1 emphasizes the joint significance of portfolio quality, management efficiency, and active borrowers. Configuration 2 highlights the importance of human development, management effectiveness, and portfolio quality, arguing that favourable socioeconomic circumstances can support institutional durability. Configurations 3 and 4 show how human development, active borrowers, and portfolio quality all work together to support financial sustainability. Configuration 6 is a special pathway where capital structure, human development, and active borrowers coexist with managerial inefficiency, suggesting that sustainability may still arise when other advantageous circumstances make up for operational flaws. Configurations 7 and 8 emphasize the significance of human development, managerial effectiveness, and portfolio quality. All things considered, the most common factors are portfolio quality and management effectiveness, underscoring their vital significance in maintaining MFI success. The suggested paths' empirical relevance and dependability are confirmed by the solution coverage of 0.495 and consistency of 0.816.

Table 5

Comparative Analysis for the period of 2009 to 2019

Conditions	2009						2014				2019							
	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S1	S2	S3	S4	S5	S6	S7	S8
DOTR	⊗	⊗	⊗	⊗			⊙	●	●		⊗	⊗	●	⊗				
PAR	●	⊗	•	●			●	●	⊙		●	●	●	⊗	●	●		
MIN	⊗	⊗	⊗	⊗	•	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊙	⊗	⊗	
ATB	●	●	●	●			●	●	⊙		●	●	●	⊗	●	⊗		
CS	⊙	⊙	⊙	⊙	●	●	⊙	⊙	●		⊗	⊗	⊗	●	●	⊗	⊗	
HDV	●	●	●	●	⊙		●	⊙	●	●	●	●	●	●	●	●	●	
Raw Coverage	0.22	0.21	0.21	0.18	0.11	0.11	0.25	0.16	0.16	0.07	0.28	0.22	0.28	0.20	0.09	0.11	0.27	0.16
Unique Coverage	0.01	0.01	0.01	0.03	0.02	0.01	0.09	0.07	0.02	0.01	0.08	0.01	0.06	0.02	0.01	0.01	0.01	0.01
Consistency	0.80	0.81	0.81	0.81	0.80	0.824	0.82	0.82	0.86	0.83	0.833	0.84	0.82	0.83	0.81	0.83	0.83	0.80
Solution coverage			0.364				0.355						0.495					
Solution Consistency			0.802				0.809						0.816					

Note: ● = Core presence; • = Peripheral presence; ⊗ = Core absence; ⊙ = Peripheral absence; Blank space = Condition does not contribute to the configuration (do not care)

Table 6

Comparative Analysis

Metric	2009	2014	2019
Solution Coverage	0.364	0.355	0.495
Solution Consistency	0.802	0.809	0.816
No.of Pathways	6	4	8



The model is explaining more of the variation in FSS with time without compromising dependability; coverage increases significantly by 2019 and consistency somewhat improves across all three periods. A leaner 4-pathway solution and a slight decline in coverage in 2014 (0.355) point to a phase of consolidation around fewer, more closely tied paths to FSS, followed by renewed diversification (equifinality) by 2019.

The only real near-necessary condition of the decade is MIN. With the exception of a peripheral presence in 2009-S5, MIN demonstrates core (or peripheral) absence in almost every route during all three periods. Because MIN is reverse-coded, absence is the positive direction. This means that, regardless of other condition

The second anchor condition, HDV, is read in the regular (non-reversed) orientation. Core presence in almost all routes over all three times (dominant in the main cluster of 2009, 3 of 4 pathways in 2014, and 7 of 8 in 2019). High HDV is the other constant pillar of FSS during the course of the decade, along with low MIN. In the majority of effective paths, PAR is a risk factor that is tolerated rather than something that institutions avoid. Since PAR is reverse-coded, its core/peripheral presence in most pathways (2009: S1, S3, S4; 2014: S1, S2; 2019: S1–S3, S5, S6) means that elevated PAR co-occurs with FSS in most sufficient configurations. This means that the majority of MFIs that achieve FSS are tolerating (rather than eliminating) this risk exposure, most likely due to strong compensating conditions (HDV, ATB).

Only a small number of pathways, 2009-S2 (core absence), 2014-S3 (peripheral absence), and 2019-S4 (core absence), display the purportedly "safer" low-PAR orientation. The only pathway in the dataset that is obviously risk-averse is 2019-S4, which is worth mentioning as a separate pathway because it is the only 2019 route where ATB is core-absent, indicating a truly different institutional strategy (risk-and-technology-averse) rather than a variation of the dominant logic.

ATB. In 2009 (S1–S4) and 2014 (S1–S2), core presence predominates; however, in 2019, it breaks into core absence in S4 and S6 and core presence in the high-coverage routes (S1–S3, S5). By 2019, ATB becomes a distinguishing condition instead of a nearly ubiquitous one.

The table's sharpest reversal, CS, is worth restating with the PAR/MIN correction even though it has nothing to do with it. Core presence only in the minor 2009 cluster (S5–S6) and peripheral absence in the dominant 2009 cluster; mixed in 2014; flips to core absence in the majority of high-coverage 2019 pathways (S1–S3, S6–S7), with core presence only remaining in S4–S5. This inversion between the pre- and post-2014 periods makes a compelling case for a "structural break" narrative, which could be linked to changes in financial and regulatory frameworks.

DOTR. Core absence in 2009; core presence in half of the 2014 routes (S2, S3); mainly returns to core absence by 2019 (with the exception of S3). Rather than being a stable driver, it is oscillating and context-dependent; this is perhaps something that needs more theoretical explanation in relation to changes in interest rates or regulatory regimes around 2014.

Table 7

Revised Pathway Typology

Period	Dominant Logic	Minor logic
2009	ATB+HDV core presence, Low MIN, PAR tolerated and elevated (S1, S3, S4)	S2: risk-averse variant (Low PAR); S5–S6: cost-driven cluster
2014	Low MIN, HDV+ATB presence, PAR elevated (S1–S2), DOTR shifting towards presence	S3: cost-driven, PAR peripherally low (more conservative); S4: minimalist HDV-only route
2019	HDV-anchored, MIN low, PAR elevated and tolerated (S1–S3, S5–S6), CS largely core-absent	S4: the decade's only clearly risk-averse pathway (PAR low, ATB absent); S7: parsimonious PAR-low+HDV-only route with strong standalone coverage (0.271)

- Throughout the whole 2009–2019 era, low MIN is the closest thing to a prerequisite for FSS; it is present in every pathway family, year, and nearly every year.



- Alongside low MIN, high HDV is the second reliable backbone condition that anchors almost all paths.
- The majority of FSS-achieving MFIs tolerate elevated PAR rather than avoid it; the reverse-coded reading reveals that risk tolerance, not risk aversion, is the predominant institutional strategy throughout all three periods, with genuinely risk-averse pathways (low PAR) remaining a minority throughout and appearing only once with true prominence (2019-S4).
- Around 2014, CS reverses course, and DOTR fluctuates, both of which point to mid-decade structural/regime changes worthy of independent theoretical examination.
- Equifinality rises dramatically by 2019 (8 paths compared to 4–6 earlier), coinciding with the sector's first discernible appearance of a risk-averse alternative route (S4)—a sign of increasing strategic diversity among MFIs attaining FSS.

4. Conclusion

Financial self-sufficiency (FSS) is characterized by both stability and change across the 2009–2019 period, according to a longitudinal analysis of configurational routes. Low management inefficiency (MIN) and high human development (HDV), which regularly present in almost all high-FSS settings, continue to be the most stable core conditions over the course of the three observation years. These results show that the long-term basis of financial sustainability among microfinance institutions (MFIs) is operational effectiveness and a favorable socioeconomic environment.

On the other hand, significant configurational changes over time are observed in the remaining situations. In 2009, depth of outreach (DOTR) was consistently core absence; in 2014, it was core presence in multiple configurations; however, in 2019, it was primarily core absence.

The most noticeable change is shown in capital structure (CS), which went from being mostly peripheral in 2009 to having brief strategic significance in 2014 before becoming core absent in the majority of dominant configurations by 2019. In a similar vein, active borrowers (ATB) shifted from a nearly universal core condition in 2009 and 2014 to a more contingent condition in 2019, indicating the rise of alternate routes to financial sustainability that do not rely on keeping a sizable borrower base.

Portfolio at risk (PAR) continues to play a somewhat consistent but more varied function. 2019 presents a clear low-risk pathway with significant empirical coverage, showing that both risk-tolerant and risk-averse methods can ensure financial sustainability, even as configurations with comparatively higher credit risk continue to predominate throughout the study period. Overall, the results show that MFIs depend more and more on many potential combinations of organizational and contextual factors with time, even as the fundamental drivers of FSS remain constant. The concept of equifinality is strengthened by this increasing configurational diversity, which implies that several strategic approaches rather than a single ideal configuration can lead to financial sustainability.

Table 8

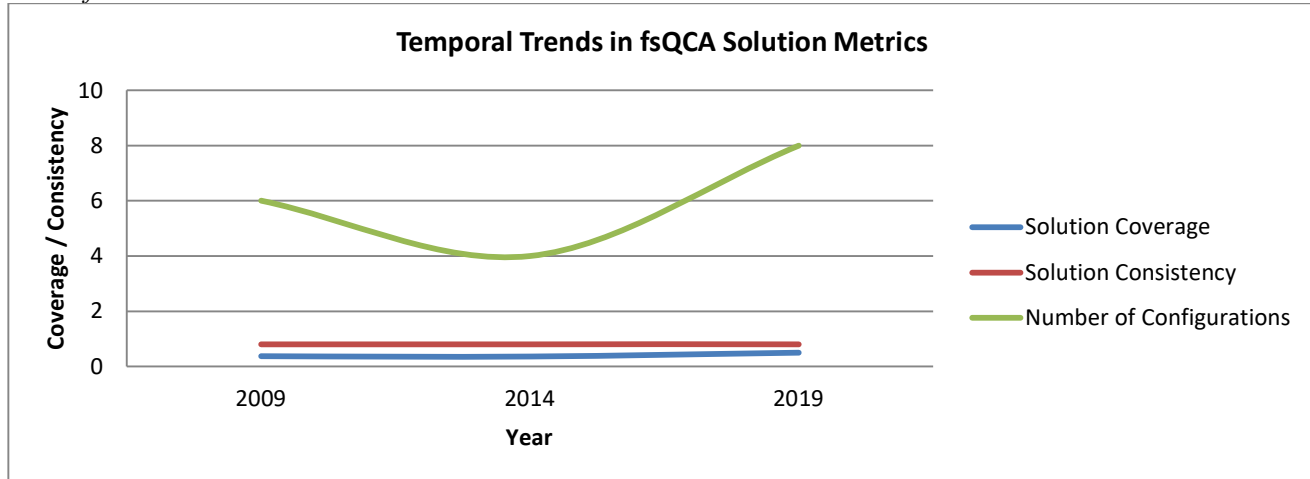
Shows how the Conditions Moved over the same period

Variable	2009	2014	2019
MIN	Low (fav.)	Low (fav.)	Low (fav.)
HDV	High, core	High, core	High, core
PAR	Elevated	Elevated	Elevated*
ATB	Universal	Universal	Splits
CS	Mostly absent	Mixed	Mostly absent
DOTR	Absent	Presence (half)	Absent (mostly)



Figure 2

Trend from 2009 -2019



4.1 Policy Implications

the longitudinal findings suggest that policymakers and microfinance institution (MFI) managers should prioritize improving managerial efficiency and operating within environments that promote human development as low management inefficiency (MIN) and high human development (HDV) consistently emerge as the stable foundations of financial self-sufficiency throughout 2009–2019. Thus, investments in institutional quality, personnel capability, governance, and operational effectiveness are likely to produce long-term financial results in a variety of settings.

The analysis also shows that no single organizational model is consistently successful since the contributions of depth of outreach (DOTR), active borrowers (ATB), capital structure (CS), and portfolio at risk (PAR) change over time. Therefore, instead of implementing uniform policy frameworks, policymakers should support adaptable, context-sensitive strategies that enable MFIs to modify their funding arrangements, outreach plans, and risk management procedures in response to shifting institutional and economic circumstances. Rather than focusing just on increasing the number of borrowers or certain financing arrangements, regulatory frameworks should promote strategic flexibility while upholding good operational management. All things considered, the results are in favor of policies that bolster institutional capacities, enhance the overall environment for human development, and give MFIs the freedom to explore various avenues for long-term financial viability.

4.2 Future Research

To provide a more thorough evaluation of the social mission of microfinance organizations, future research may include

- breadth of outreach as an additional outreach factor in addition to depth of outreach. While breadth of outreach indicates the scope of services offered by the number of clients contacted, depth of outreach measures the extent to which MFIs serve disadvantaged people. Analyzing both aspects at the same time could provide a greater understanding of how outreach tactics interact with contextual and organizational elements to affect financial sustainability.
- how economic development affects the financial sustainability of microfinance institutions as a contextual factor.
- Comparative research between other nations or regions could confirm whether the configurations found are consistent in various institutional contexts.
- Future studies could analyze both symmetric and asymmetric causal linkages and validate configurational findings by combining fsQCA with complementing analytical methods such panel regression, multilevel modeling, or Hierarchical Linear Modeling.



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Contribution of Authors

All the authors participated in the ideation, development, and final approval of the manuscript, making significant contributions to the work reported.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Informed Consent

Informed consent was obtained from all individual participants included in the study.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of 1964 Helsinki declaration and its later amendments.

Data Availability

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

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