PERFORMANCE DYNAMICS OF PRIMARY AGRICULTURAL CREDIT SOCIETIES IN KERALA – A MULTI-DIMENSIONAL APPROACH

Thesis
submitted to the University of Calicut
for the award of the degree of

DOCTOR OF PHILOSOPHY IN COMMERCE

By
JOHNSON N J

Under the supervision of
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PG & RESEARCH DEPARTMENT OF COMMERCE AND MANAGEMENT STUDIES

SRI C ACHUTHA MENON GOVERNMENT COLLEGE, THRISSUR

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CERTIFICATE

This is to certify that the thesis titled **Performance Dynamics of Primary Agricultural Credit Societies in Kerala—A Multi-Dimensional Approach,** prepared by Johnson N J, for the award of the degree of 'Doctor of Philosophy in Commerce' of the University of Calicut, is a record of bona fide research work carried out under my supervision and guidance. No part of the thesis has been submitted for any degree, diploma, fellowship, or similar title or recognition before. He is permitted to submit the thesis.

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DECLARATION

I hereby declare that the thesis titled **Performance Dynamics of Primary Agricultural Credit Societies in Kerala—A Multi-Dimensional Approach** is based on the original work done by me under the guidance of Dr. Deepa Paul and has not been included in any other thesis submitted previously for the award of any degree. The contents of the thesis have undergone a plagiarism check using *iThenticate software* at *C.H.M.K. Library, University of Calicut*, and the similarity index was found within the permissible limit. I also declare that the thesis is free from *AI-generated* content.

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ACKNOWLEDGEMENT

I humbly submit this thesis with deep gratitude to the *Almighty Lord Jesus Christ*, whose divine grace, guidance, and blessings strengthened me throughout this academic journey. His presence gave me perseverance, wisdom, and hope during every stage of this research work.

I express my sincere and profound gratitude to my research supervisor, Dr. Deepa Paul, Associate Professor, Sri. C. Achutha Menon Government College Thrissur, whose constant guidance, scholarly insights, constructive criticism, and unwavering support made this research work possible. Her academic expertise and encouragement greatly enriched the quality of this study.

I extend my respectful thanks to Dr. Manojkumar P. S., principal of the college, for providing a supportive academic environment and the necessary facilities to carry out this research successfully.

I am grateful to Prof. (Dr.) Vijayan P. K., Head of the Department, PG & Research Department of the college, for valuable encouragement, motivation, and administrative support throughout the period of my doctoral programme. Gratitude to former HoDs Dr. E. Murali, Smt. Ambika P. V., and Sri S. V. Rajkumar is boundless.

I owe my sincere thanks to the subject experts, analysts, and statistical experts who extended their valuable time, technical guidance, and insightful suggestions, which significantly strengthened the methodological and analytical rigor of this study. I also acknowledge with appreciation the support and cooperation extended by my fellow faculty members and colleagues, whose encouragement and academic interactions contributed positively to the completion of this research. On this occasion I thankfully remember the contributions of Dr. Aparna Sajeev, Dr. Eldhose K. V., Dr. Anand K., Dr. Madhusoodanan Kartha, and Dr. Unnikrishnan Thekkeppat with deep gratitude.

My heartfelt gratitude is reserved for my beloved parents and family members, whose unconditional love, prayers, patience, and moral support sustained me throughout this long academic pursuit. Their sacrifices and belief in me were my greatest source of strength.

I also thank everyone who helped with this research.

Finally, I acknowledge with humility that any limitations or shortcomings in this thesis remain solely my responsibility.

Johnson N. J.

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LIST OF ABBREVIATIONS

Abbreviation	Full Form
CAMEL	Capital Adequacy, Asset Quality, Management, Earnings and Liquidity
CAMIS	Co-operative Audit and Monitoring Information System
CAP	Capital Adequacy Proxy
CR	Cash Ratio
DEA	Data Envelopment Analysis
DE	Debt–Equity Ratio
DG	Deposit Growth
DLC	Deposit–Loan Coverage Ratio
DR	Diversification Ratio
EE	Establishment Expenses
FE	Fixed Effects Model
FSCS	Farmers Service Cooperative Society
GDP	Gross Domestic Product
GLOSP	Growth, Liquidity, Operational Efficiency, Solvency and Profitability
GPR	Gross Profit Ratio
ICA	International Cooperative Alliance
IMF	International Monetary Fund
LIndex	Liquidity Index
LG	Loan Growth
LWC	Loans to Working Capital Ratio
MAI	Movable and Immovable Assets
MEM	Membership
MG	Membership Growth
MI	Miscellaneous Income
NABARD	National Bank for Agriculture and Rural Development
NP	Net Profit
NPA	Non-Performing Assets
NPM	Net Profit Margin
OCR	Operating Cost Ratio
OECD	Organisation for Economic Co-operation and Development
OE	Operational Efficiency
OIndex	Operational Efficiency Index

OLS	Ordinary Least Squares
PACS	Primary Agricultural Credit Societies
PCA	Principal Component Analysis
PG	Profit Growth
PIndex	Profitability Index
RBI	Reserve Bank of India
RE	Random Effects Model
ROWC	Return on Working Capital
RF	Reserve Fund
SC	Share Capital
SCB	Service Cooperative Bank
SIndex	Solvency Index
SLBC	State Level Bankers' Committee
TI	Total Income
WC	Working Capital
WCR	Working Capital Ratio
Z-Score	Standardised Score Based on Mean and Standard Deviation

ABSTRACT

Primary Agricultural Credit Societies (PACS) constitute the foundational tier of India's cooperative credit structure and play a critical role in rural financial intermediation. Despite operating within a relatively uniform regulatory and institutional framework in Kerala, PACS exhibit persistent heterogeneity in financial performance, raising concerns regarding sustainability, efficiency, and governance. This study examines the performance dynamics of PACS in Kerala through a multidimensional analytical framework, treating profitability not as an isolated accounting outcome but as a systemic manifestation of underlying structural conditions. Using audited secondary data obtained from the Cooperative Accounting Management Information System (CAMIS), the study analyses a purposively selected longitudinal sample of persistently profit-making and persistently loss-making PACS over a five-year period. The research develops and empirically validates a composite performance framework—GLOSP—integrating growth, liquidity, operational efficiency, and solvency as core structural dimensions, while treating profitability as an outcome variable.

The empirical strategy combines descriptive diagnostics, Z-score standardisation, composite index construction, mean difference testing, panel regression modelling, and binary choice estimation. The findings demonstrate that PACS performance is inherently multidimensional and cannot be explained by isolated financial indicators. Cross-sectional models indicate that operational efficiency and liquidity are comparatively associated with profitability variation; however, panel estimations reveal that no single dimension independently explains within-institution profitability over time. These results suggest that cooperative sustainability emerges from the interaction of structural financial conditions rather than from dominant individual predictors.

The GLOSP composite index enables the classification of institutions into differentiated performance categories and facilitates a quadrant-based evaluation combining structural strength and profitability status. The analysis reveals that structural capacity and short-term profitability may diverge due to institutional constraints, timing effects, and managerial factors. The study concludes that uniform revival and recapitalisation strategies are insufficient to address institutional

heterogeneity and that diagnostic, multidimensional monitoring frameworks are essential for sustainable cooperative governance.

By advancing a structured composite performance model and empirically demonstrating the systemic nature of cooperative sustainability, the study contributes conceptually, methodologically, and policy-wise to the literature on cooperative finance and rural financial institutions.

Keywords: Primary Agricultural Credit Societies (PACS); Multidimensional Performance Evaluation; Cooperative Finance; Composite Performance Index (GLOSP); Profitability Dynamics; Rural Financial Sustainability

സംഗ്രഹം

ഇന്ത്യയിലെ സഹകരണ വായ്പാ സംവിധാനത്തിന്റെ അടിസ്ഥാന ഘടകമായ പ്രൈമറി അഗ്രികൾച്ചറൽ ക്രെഡിറ്റ് സൊസൈറ്റികൾ (PACS) ഗ്രാമീണ സാമ്പത്തിക ഇടപാടുകളിൽ നിർണായക പങ്ക് വഹിക്കുന്നു. കേരളത്തിൽ സമാനമായ നിയമ, ഭരണഘടനാ ചട്ടക്കൂടിനകത്ത് പ്രവർത്തിക്കുന്നുവെങ്കിലും PACS-കളിൽ സാമ്പത്തിക പ്രകടനത്തിൽ ശ്രദ്ധേയമായ വ്യത്യാസങ്ങൾ നിലനിൽക്കുന്നു. ഈ വ്യത്യാസം സ്ഥാപനങ്ങളുടെ ദീർഘകാല സ്ഥിരത, കാര്യക്ഷമത, ഭരണനിലവാരം എന്നിവയെക്കുറിച്ചുള്ള ആശങ്കകൾ ഉയർത്തുന്നു. ഈ പഠനം കേരളത്തിലെ PACS-കളുടെ പ്രകടനഗതിശാസ്ത്രം ബഹുമാനദണ്ഡ അടിസ്ഥാനത്തിലുള്ള വിശകലനരീതിയിലൂടെ പരിശോധിക്കുന്നു. ലാഭം എന്നത് ഒറ്റപ്പെട്ട അക്കൗണ്ടിംഗ് ഫലമല്ല, മറിച്ച് അടിസ്ഥാന ഘടനാപരമായ സാമ്പത്തിക സാഹചര്യങ്ങളുടെ സമഗ്ര പ്രതിഫലനമാണെന്ന നിലപാടാണ് പഠനം സ്വീകരിക്കുന്നത്.

കോ-ഓപ്പറേറ്റീവ് അക്കൗണ്ടിംഗ് മാനേജ്മെന്റ് ഇൻഫർമേഷൻ സിസ്റ്റം (CAMIS) മുഖേന ലഭ്യമായ ഓഡിറ്റുചെയ്ത ദ്വിതീയ ഡാറ്റ ഉപയോഗിച്ച്, തുടർച്ചയായി ലാഭം രേഖപ്പെടുത്തിയതും തുടർച്ചയായി നഷ്ടം രേഖപ്പെടുത്തിയതുമായ PACS-കളെ ഉൾപ്പെടുത്തി ഒരു ദീർഘകാല സാമ്പിൾ വിശകലനം ചെയ്തു. പഠനം GLOSP എന്ന സംയുക്ത പ്രകടന ചട്ടക്കൂട് രൂപപ്പെടുത്തുകയും അതിന്റെ പ്രായോഗിക സാധുത പരിശോധിക്കുകയും ചെയ്യുന്നു. Growth (വളർച്ച), Liquidity (ദ്രവത്വം), Operational Efficiency (പ്രവർത്തന കാര്യക്ഷമത), Solvency (ദീർഘകാല സാമ്പത്തിക സ്ഥിരത) എന്നീ ഘടകങ്ങളെ ഘടനാപരമായ പ്രകടന അളവുകളായി ഉൾപ്പെടുത്തുകയും ലാഭത്തെ ഫലപരമായ ഘടകമായി പരിഗണിക്കുകയും ചെയ്യുന്നു.

വിവരണാത്മക വിശകലനം, Z-score സ്റ്റാൻഡേർഡൈസേഷൻ, സംയുക്ത സൂചിക നിർമ്മാണം, ശരാശരി വ്യത്യാസ പരിശോധന, പാനൽ റെഗ്രഷൻ മോഡലുകൾ, ബൈനറി ലോജിറ്റ്/പ്രോബിറ്റ് വിശകലനം എന്നിവ ഉൾപ്പെടുത്തി ബഹുഘട്ട വിശകലനരീതി സ്വീകരിച്ചു. കണ്ടെത്തലുകൾ PACS-കളുടെ പ്രകടനം സ്വഭാവത്തിൽ തന്നെ ബഹുമാനദണ്ഡപരമാണെന്നും ഒറ്റപ്പെട്ട സാമ്പത്തിക അനുപാതങ്ങളാൽ അതിനെ വിശദീകരിക്കാൻ കഴിയില്ലെന്നും വ്യക്തമാക്കുന്നു. ക്രോസ്-സെക്ഷണൽ മോഡലുകളിൽ പ്രവർത്തന കാര്യക്ഷമതയും ദ്രവത്വവും ലാഭവുമായി ബന്ധപ്പെട്ടതായി കണ്ടെത്തിയെങ്കിലും, പാനൽ വിശകലനത്തിൽ ഒരൊറ്റ ഘടകവും സമയാനുസൃതമായ ലാഭ വ്യത്യാസങ്ങളെ സ്വതന്ത്രമായി വിശദീകരിക്കുന്നില്ല. ഇതിലൂടെ സഹകരണ സ്ഥാപനങ്ങളുടെ സ്ഥിരത വിവിധ സാമ്പത്തിക ഘടകങ്ങളുടെ പരസ്പര ഇടപെടലിൽ നിന്നാണ് രൂപപ്പെടുന്നതെന്ന് വ്യക്തമാകുന്നു.

GLOSP സംയുക്ത സൂചിക PACS-കളെ വിവിധ പ്രകടന വിഭാഗങ്ങളായി വർഗ്ഗീകരിക്കാൻ സഹായിക്കുകയും ഘടനാപരമായ ശക്തിയും ലാഭസ്ഥിതിയും സംയുക്തമായി വിലയിരുത്താനുള്ള ചട്ടക്കൂട് നൽകുകയും ചെയ്യുന്നു. ഘടനാപരമായ ശക്തിയുള്ള സ്ഥാപനങ്ങൾ പോലും കുറച്ചുകാലയളവിൽ ലാഭക്കുറവ് നേരിടാമെന്നതും സ്ഥാപനപരമായ നിയന്ത്രണങ്ങൾ, സമയ വൈകല്യങ്ങൾ, മാനേജീരിയൽ ഘടകങ്ങൾ തുടങ്ങിയവ ഇതിൽ പങ്ക് വഹിക്കാമെന്നതും പഠനം സൂചിപ്പിക്കുന്നു. അതിനാൽ ഏകീകൃത പുനരുദ്ധാരണ നയങ്ങൾക്കു പകരം ബഹുമാനദണ്ഡ അധിഷ്ഠിത നിരീക്ഷണ സംവിധാനങ്ങൾ ആവശ്യമാണ് എന്നതാണ് പഠനത്തിന്റെ പ്രധാന നിർദ്ദേശം.

പ്രധാന വാക്കുകൾ

പ്രൈമറി അഗ്രികൾച്ചറൽ ക്രെഡിറ്റ് സൊസൈറ്റികൾ (PACS); ബഹുമാനദണ്ഡ പ്രകടന വിലയിരുത്തൽ; സഹകരണ ധനവ്യവസ്ഥ; GLOSP സംയുക്ത സൂചിക; ലാഭഗതിശാസ്ത്രം; ഗ്രാമീണ സാമ്പത്തിക സ്ഥിരത.

Chapter 1

INTRODUCTION

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CHAPTER I

INTRODUCTION

1.1 Background of the Study

Primary Agricultural Credit Societies (PACS) are the base-level institutions of India's cooperative credit structure (Singh, 2024). They provide short-term and medium-term credit to rural households and marginal farmers (RBI, 2021). As grassroots-level institutions, PACS provide affordable credit to rural people and support rural development and financial inclusion (Government of India, 2022). Their performance affects farm productivity, income stability, and livelihoods for rural people (RBI, 2021). In short, PACS support the rural credit system and economy (NABARD, 2021).

In Kerala, cooperatives, especially PACS, hold a unique place in rural finance (Jose & Chathukulam, 2024). They are functioning in every part of Kerala, alongside commercial banks, with a focus on rural and agricultural development (Lakshmi & Raju, 2021). PACS mobilises savings and lends them to vulnerable groups, like small farmers and rural households (Senapati & Bhatia, 2018). Thus, PACS fill the gaps left by commercial banks in the financial inclusion process. (RBI, 2021; NABARD, 2022; Government of Kerala, 2023).

In Kerala, PACS prioritises agriculture and allied sectors (Johnson & Paul, 2024). They channel advances to high-risk, low-profit areas key to rural livelihoods (Solomon, 2023; Government of Kerala, 2023). They handle deposits, short- and medium-term loans, input distribution, consumer stores, produce marketing, and value addition processes (Economic Review, Kerala, 2024). These roles reinforce their community links and economic impact. This also reflects their financial role and socio-economic significance in the state.

However, Kerala's PACS show uneven health in many aspects. On one side, growth is visible in membership, deposits, and loans. Reports show that membership rises, but active borrowers lag, limiting real outreach; loans grow, yet recovery weakens (Sumaya, 2021). Overdues and NPAs rise faster than disbursals, straining liquidity and stability (RBI, 2021; NABARD, 2022). It indicates the inability of PACS

to maintain balance between credit growth and recovery discipline. Dongre and Swamy (1999) point out that quantitative expansion without proper financial control can intensify institutional weakness.

The financial outcomes of PACS further reveal this imbalance. Profit-making and loss-making societies coexist within the same regulatory and socio-economic environment. This happens in an economic environment where all these PACS have similar access to refinancing facilities, audit supervision, and policy support mechanisms (Tripathy et al., 2021). In several cases, it is visible that accumulated losses have continued to rise even as overall business volume expands (Parayil & Sreekumar, 2003). This pattern indicates that scale alone does not ensure institutional sustainability. Internal structural factors such as cost efficiency, fund deployment practices, leverage structure, recovery effectiveness, etc. also play a decisive role in shaping the financial performance of cooperatives (Lehmann et al., 2004; Johnson & Paul, 2024). The existence of profit-making and loss-making societies in the same environment, therefore, raises important questions regarding their performance and efficiency.

These instances also point to the inadequacy of existing performance evaluation tools and strategies. It demands a multidimensional analytical framework capable of diagnosing the real drivers of financial performance across cooperatives. This recognition forms the core motivation for the present study, which seeks to develop a systematic, multidimensional framework to analyse the performance dynamics of PACS.

1.2 The Research Problem

The performance of PACS is generally assessed using financial indicators such as profit or loss, loan recovery ratios, or audit classifications. These measures often fail to evaluate the multidimensional nature of financial health, as these studies have limited integration of various financial dimensions. Moreover, standardised frameworks capable of systematically evaluating PACS's multidimensional performance are limited. This methodological gap constrains evidence-based decision-making by regulators, cooperative administrators, and policymakers.

1.3 Research Questions

The following research questions arise from the above discussion and the review of related literature *(a detailed SLR is given in chapter 2)*:

1. What structural and financial characteristics differentiate profit-making PACS from loss-making PACS in Kerala?
2. How do growth, liquidity, operational efficiency, and solvency interact to influence profitability outcomes of PACS?
3. Which financial dimensions exert the strongest practical influence on PACS performance?
4. Can a composite, multidimensional performance framework be developed and validated to assess performance dynamics among PACS?

1.4 Objectives of the Study

Based on the research questions, the objectives set for the study are:

1. To examine the financial and operational structure of PACS in Kerala.
2. To compute and evaluate the key financial indicators related to growth, liquidity, operational efficiency, solvency, and profitability for selected PACS.
3. To analyse the financial determinants of sustained profitability and persistent financial distress among profit-making and loss-making PACS.
4. To develop and empirically validate a multidimensional performance framework for PACS.

1.5 Rationale and Scope of the Study

The rationale of the present study arises from the absence of an integrated framework for evaluating the multidimensional financial performance of PACS. Existing assessments of PACS' performance are largely dependent on financial ratios, audit classifications, or surplus–deficit indicators. These evaluation tools often fail to consider the interaction among structural and financial dimensions of PACS, such as growth indicators, liquidity discipline, operational efficiency, and solvency strength. This hinders systematic diagnosis of institutional sustainability and limits evidence-based policy intervention.

The present study addresses this methodological gap by developing and empirically validating a multidimensional performance framework for evaluating the performance of PACS. This study therefore seeks to develop and empirically validate a multidimensional performance evaluation framework capable of explaining different financial outcomes. The proposed framework is developed using the statistically identified financial dimensions that emerged out of the analytical procedures followed in the study.

The study is focused on the quantitative financial performance analysis of PACS functioning in Kerala. Audited official secondary data from the CAMIS database is used for the analysis. *Co-operative Audit and Monitoring Information Sy*stem (CAMIS) is the official database of audited financial reports of cooperatives functioning under the Registrar of Cooperative Societies in Kerala. Using this officially standardised dataset, the study provides a multidimensional assessment of PACS' performance in Kerala. The study thus substantiates the need for an analytical framework specifically aligned with the institutional characteristics of cooperative credit societies.

This analysis aims to identify the performance patterns of PACS rather than year-specific fluctuations. Institutional performance is examined through standardised financial indicators, grouped under the growth, liquidity, operational efficiency, solvency, and profitability dimensions. These indicators are aggregated into dimension-specific indices and further synthesised into a composite performance framework. This framework is used for diagnostic and comparative purposes.

The study is analytical and diagnostic in orientation. It does not conduct any behavioural analyses, governance assessments through primary surveys, or forecasts of future performance. Again, the present study does not include the social outreach, welfare impact, and developmental roles of PACS. The findings are intended to provide a structured financial evaluation framework applicable to PACS functioning under similar regulatory characteristics.

1.6 Conceptual Overview of the GLOSP Model

The core of this study is an empirically derived multidimensional performance framework, referred to as the GLOSP framework, which is developed through

statistical analysis of financial indicators. The framework integrates five interrelated dimensions—growth, liquidity, operational efficiency, solvency, and profitability—to assess performance of PACS. Each dimension is developed using selected indicators available in the audited financial statements of PACS. The framework functions as an analytical and diagnostic tool for performance evaluation and classification of PACS. *(A detailed explanation of the GLOSP framework is presented in Chapter III).*

Statistical tests used for the analysis indicate that growth, liquidity, efficiency, solvency, and profitability jointly explain the performance of PACS. The empirical analysis of financial indicators from the sample PACS resulted in the development of the performance framework. The framework therefore functions as an analytical and assessment tool for evaluating the performance of PACS.

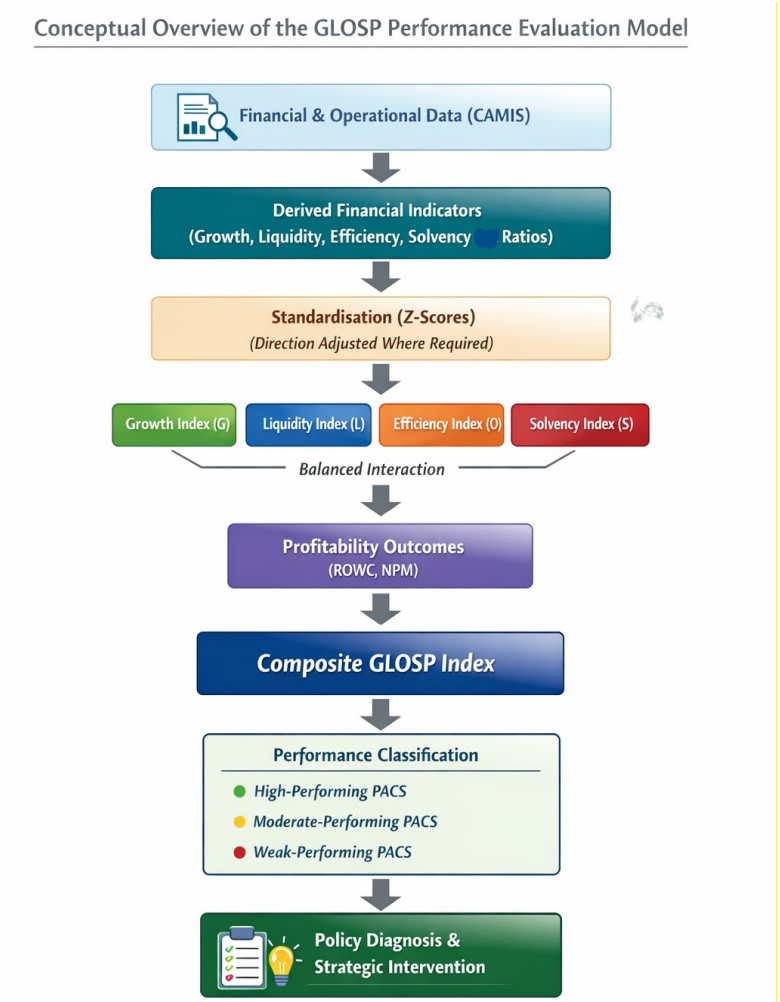

Chart 1.1 Conceptual Overview of the GLOSP Model

1.7 Methodological Overview

The study uses ratio analysis, correlation analysis, principal component analysis (PCA), mean difference tests, effect size estimation, panel regression models (fixed effects), and binary choice models (Logit and Probit) for data analysis. The GLOSP composite index is derived from standard indicators, assessed through robustness checks. *(A detailed explanation of data sources, sampling, variable construction, and analytical methods is available in Chapter IV).*

1.8 Significance of the Study

The study develops a performance framework—the GLOSP framework—for the performance assessment of PACS. This GLOSP framework is an academic contribution to the field of cooperative finance. This can be used by regulators, cooperative managers, and policymakers as a holistic measurement tool that can be applied at scale and replicated across contexts.

From a policy perspective, the study is relevant because PACS are currently undergoing digital transformation, regulatory restructuring, and modernisation initiatives under NABARD and state cooperative departments. Identifying the reasons and causes of financial success and distress in PACS can directly assist targeted interventions, resource allocations, support schemes, and capacity-building programs. The findings will also enable policymakers to prepare governance norms and operational strategies for PACS.

The findings of the study can offer diagnostic advice for the management of PACS regarding operational weaknesses, liquidity gaps, solvency risks, and growth constraints. By differentiating the performance patterns of extreme profit-making and extreme loss-making PACS, the study offers practical guidance for improving managerial practices and financial decision-making. The GLOSP composite index thus serves as a benchmarking tool that societies can use for self-assessment, performance monitoring, and strategic planning.

The study's theoretical contribution to developing performance measurement models and its methodological innovation are also significant to the cooperative

literature. It can give useful insights to the government for strengthening the cooperative credit sector in Kerala. Thus, the study aligns with the broader national goals of strengthening rural credit, modernising cooperatives, and promoting financial inclusion.

1.9 Limitations of the Study

The following limitations are acknowledged while interpreting the findings.

Firstly, the study is based on secondary data obtained from the CAMIS. Therefore, the analysis is limited to the accuracy, completeness, and reporting consistency of the data available in the CAMIS portal. Any inherent reporting delays or accounting inconsistencies may therefore influence the results to that extent.

Secondly, the study is confined to the service cooperative banks (SCB) operating under PACS within the state of Kerala. Even though the findings provide valuable insights into the functioning of PACS within this regional context, the results may not be directly generalisable to PACS in other states, where institutional structures, regulatory environments, and socio-economic conditions may differ.

Thirdly, the analysis primarily depends on quantitative financial indicators to evaluate performance. Qualitative aspects such as leadership quality, governance culture, member participation, and political influence could not be included due to the absence of consistent measurable data.

Fourthly, the study adopts a post-COVID analytical focus to ensure stability and comparability of financial indicators. While this enhances analytical consistency, it limits the examination of crisis-period behavioural responses of PACS.

Fifth, the GLOSP framework is constructed, giving equal weight to standardised indicators within each dimension. Although this approach ensures transparency and replicability, alternative weighting schemes based on expert judgement or advanced statistical techniques may yield slightly different index values.

Finally, the study evaluates the financial performance of PACS over a five-year period. Therefore, the study timeframe may not fully capture the effects of long-term structural transformations and institutional reforms. The results should be interpreted in light of these limitations, and future research suggestions are based on this.

1.10 Organisation of the Thesis

The thesis is divided into nine chapters. Chapter I is the introduction. It presents the background and context of PACS in Kerala. The chapter also explains the rationale, research objectives, scope, significance, and limitations of the study. It also outlines the conceptual framework guiding the analysis.

Chapter II gives the systematic literature review. It examines prior studies on growth, liquidity, operational efficiency, solvency, and profitability. This review also points out the research gaps.

Chapter III discusses the theoretical framework of PACS. It also explains the conceptual structure of the GLOSP performance evaluation framework introduced in this study. The chapter justifies the selection of indicators and the integration of dimensions within a diagnostic framework. The chapter also establishes the theoretical and empirical foundation for developing the GLOSP framework.

Chapter IV explains the research methodology used in the study. It explains the data sources, sampling framework, and variables used. It also explains the derived variables used and the statistical and econometric tools applied for the analysis.

Chapter V examines the structural and indicator-based financial framework of PACS. It analyses the financial and operational structure of selected institutions. The chapter evaluates key indicators relating to growth, liquidity, operational efficiency, solvency, and profitability using descriptive and multivariate techniques.

Chapter VI analyses the financial determinants of profitability and distress among PACS. It uses comparative and inferential methods, including mean difference tests, effect size analysis, panel regression models, and binary choice models. The

chapter detects financial factors distinguishing profit-making and loss-making societies.

Chapter VII explains the derivation, application, and validation of the GLOSP composite index. It assesses multidimensional performance differences among PACS.

Chapter VIII provides the policy implications arising from the empirical findings. It gives strategic and evidence-based recommendations to strengthen the performance dynamics of PACS in Kerala.

Chapter IX is the conclusion. It summarises the major findings and general conclusions. The chapter also outlines the scope for further research.

Chapter 2

SYSTEMATIC LITERATURE REVIEW

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CHAPTER II

SYSTEMATIC LITERATURE REVIEW

2.1 Introduction

In the context of Kerala, PACS occupy an important position, as they are functioning as major financial institutions in the rural areas of the state (AA & Johnson, n.d.). Therefore, the performance of PACS is also a major concern for the rural economy, both at academic and policy levels. Considering the importance of cooperatives, the Government of Kerala has established a separate department to look after their affairs. The Department of Cooperation is the government's dedicated department for the formation, organisation, and coordination of cooperative institutions in Kerala. Despite operating under such a common regulatory framework and similar institutional conditions, PACS in Kerala exhibit wide variation in financial performance outcomes (Tripathy et al., 2021).

Existing literature on cooperatives seriously discusses the performance of PACS, mainly concentrating on their profitability. Profitability is an important indicator of a society's financial performance. However, assessing the financial performance of PACS solely based on profit does not accurately reflect the financial soundness of a society. Studies reveal that the interaction of multiple factors results in the financial soundness of a society (Babihuga, 2007) (Sundararajan et al., 2002) (Arzova & Sahin, 2024). Many studies have pointed out the different factors that affect PACS's performance. Consolidation of these studies reveals that growth, liquidity, operational efficiency, and solvency are the important factors that affect the performance of PACS. This means that the performance assessment of PACS should examine the growth patterns, liquidity management, operational efficiency, and solvency position, rather than profitability alone.

Moreover, some studies have pointed out that the profitability alone cannot be fully depended on to assess the financial soundness and strength of PACS (Soni & SALUJA, 2013); (Maity & Dey, 2020). Studies indicate that the cooperatives may result in short-term losses due to many reasons, even if they are internally strong

(Nilsson et al., 2012); (Piccoli et al., 2021). Similarly, even under a weak structural background, the PACS may show profit in financial statements. These findings underline the limitations of profit-centric evaluation strategies. It also points out the need for a multi-dimensional evaluation framework capable of covering all aspects of cooperative performance dynamics. Thus, profitability of PACS is better interpreted as an outcome of underlying performance dynamics rather than as a standalone measure of institutional strength (Grashuis & Su, 2019).

Therefore, it is crucial to conduct a systematic review of the existing literature to understand how different aspects of financial and operational performance have been conceptualised, measured, and analysed in cooperative and rural finance studies. Various studies have used different approaches for the purpose. These approaches range from single-ratio analyses to composite performance indices and econometric models of financial outcomes. However, these studies have limited integration across various performance dimensions and do not adequately address their dynamic interactions.

In this context, this chapter conducts a systematic literature review (SLR) to synthesise existing theoretical and empirical contributions related to the performance of cooperative institutions, especially with reference to PACS. The review aims to identify dominant themes, methodological approaches, and specifically the evaluation strategies in available integrated frameworks. The review also aims to identify gaps in the literature, especially with respect to the absence of an integrated framework capable of explaining PACS's performance dynamics. By situating profitability within a broader performance context, this chapter lays the conceptual foundation for the multidimensional analytical framework adopted in the subsequent chapters of the study.

2.2 Conceptual Understanding of Performance and Profitability in Cooperatives

The concept of performance in cooperative institutions means the broader financial-institutional capability to sustain operations, manage risks, and fulfil developmental objectives over time. *Profit* cannot be the single performance criterion for the cooperatives, as these institutions need to balance between financial viability

and member-oriented service delivery. Therefore, many recent studies do not consider profitability as a comprehensive measure of cooperative performance (Xaba et al., 2018); Franken, J. R., & Cook, M. L. (2014). Most of these studies consider profitability as one of the several outcome indicators reflecting the effectiveness of underlying financial and operational processes. In this context, performance should also be understood as a multidimensional construct.

According to Narayanaswamy (2002) and Niranjan Raj (1998), profitability in PACS should be explained in the context of its ability to raise capital internally and to absorb credit risk. PACS should be able to maintain member confidence and to reduce dependence on external borrowings. Profitability of PACS is a major area widely discussed in many literatures. Both structural and operational factors influence profitability in PACS (Panda, D. K et al., 2023). The structural factors include capital base, scale of operations, asset composition, etc., and the operational factors are cost efficiency, loan recovery, fund utilisation, etc. In addition to these, PACS face certain inherent constraints in their functioning, such as regulated interest rates, politically influenced lending, limited product flexibility, and high transaction costs Swinnen, J. F., & Gow, H. R. (1999). All these arguments point toward the conclusion that profitability alone cannot reflect the real performance dynamics of PACS.

In short, the existing literature itself does not support the performance evaluation of PACS using profitability as a sole indicator. The studies strongly support the view that the performance of PACS is the result of interaction among various dimensions of PACS, such as growth behaviour, liquidity discipline, operational efficiency, and solvency strength. Therefore, these dimensions are to be examined to get a proper understanding about the performance of PACS. Moreover, such dimensions should be evaluated both in isolation and in combination to get the real picture of PACS. These views and arguments necessitate a systematic literature review in the matter. This systematic review is included in the following sessions.

2.3 Need for a Systematic Literature Review

Earlier studies on PACS have generated valuable insights into specific operational issues—such as overdues, recovery performance, or governance

weaknesses. Such studies mainly used descriptive analysis, financial ratios, or case-based evaluations to arrive at their conclusions. However, they often fail to explain why financial outcomes of PACS differ sharply across societies functioning under similar environments.

A systematic literature review is therefore necessary for three primary reasons:

1. ***Fragmentation of Evidence*:** Existing research examines individual performance indicators independently. Some studies identify defects in loan management and overdue issues as the problems behind the poor performance of PACS, while some other studies reveal management inefficiencies and political interferences as the reasons. Such arguments result in a fragmented understanding of PACS profitability.
2. ***Methodological Diversity*:** The use of various methodological tools and approaches in the studies often makes it difficult to arrive at comparative conclusions on cooperative performance. Varied methodologies employed in studies—ranging from simple ratio analysis to Data Envelopment Analysis (DEA) and regression models—make cross-study comparison difficult.
3. ***Absence of Integrated Frameworks*:** Even though individual studies have pointed out the role and relevance of various indicators in the overall performance of PACS, limited attempts have been made to create a unified analytical structure tailored to PACS.

Accordingly, this chapter makes an attempt to consolidate, evaluate, and synthesise prior research, with a view to establish a coherent foundation for the development of the GLOSP (growth, liquidity, efficiency, solvency, and profitability) performance evaluation model. This systematic literature review therefore makes structured synthesis of literature and critical comparisons of them, with a view to identify research gaps relevant to PACS performance dynamics – especially with a multidimensional approach.

2.4 Review Design and Methodological Approach

The systematic literature review in this study follows the approach, combining methodological rigor with contextual relevance. As the cooperative literature has a predominance of cooperative enactments, policy documents, and official committee reports, these have been considered properly along with doctoral theses and journal publications.

2.4.1 Sources of Literature

The review considers the following categories of literature:

1. Peer-reviewed journals
2. Doctoral theses
3. Reports published by RBI, NABARD, and Government of India
4. Reports of Expert committees and commissions appointed by government and regulatory bodies
5. Books and papers on cooperative finance and rural credit

The literature review used a combination of academic databases, indexing platforms, and institutional repositories given below:

1. JSTOR
2. Elsevier (ScienceDirect)
3. Taylor & Francis
4. Shodhganga
5. Official publications by the Department of Cooperation, Government of Kerala, Kerala State Planning Board, etc.
6. Official publications from RBI, NABARD, and other regulatory bodies

Scopus and Google Scholar also have been used for a comprehensive cross-database search.

2.4.2 Period of Review

The studies published from the 1980s to 2024 have been mainly used for systematic review. However, some earlier seminal works have been included where they provide foundational theoretical or institutional insights into cooperative credit

functioning. In other chapters, we have used some studies after 2024 as contextual references.

2.4.3 Inclusion Criteria

Literature satisfying the following criteria has been included in the SLR:

1. Literature that has direct relevance to PACS, cooperative banks, or rural credit institutions
2. Literature that focuses on financial performance, profitability, efficiency, recovery, or sustainability
3. Studies that provide measurable financial indicators or policy insights
4. Research conducted within Kerala and especially in Indian or comparable cooperative contexts.

2.4.4 Exclusion Criteria

The following categories of literature were used only conceptually:

1. Literature that concentrates purely on commercial banking and lacks cooperative relevance.
2. Studies that have no financial or institutional linkage
3. Opinion-based articles without empirical grounding and data support
4. Duplicative literature that has no incremental analytical value

This filtering is done to ensure analytical clarity and academic relevance.

2.4. 5 PRISMA-Based Literature Selection Process

The PRISMA framework is used in this SLR to ensure transparency and methodological consistency. The framework structures the review process into identification, screening, eligibility assessment, and final inclusion stages. Table 2.1 summarises the PRISMA-based literature selection process adopted in the present study.

Table 2.1: PRISMA-Based Literature Selection Process

PRISMA Stage	Description	Outcome
Identification	Records retrieved from Scopus, Web of Science, JSTOR, and Google Scholar using predefined keywords. Search strings included combinations of "PACS," "cooperative credit," "financial performance," and "profitability."	612 studies were identified
Screening	Removal of duplicates and abstract-level screening	468 records screened
Eligibility	Full-text assessment based on inclusion and exclusion criteria	176 full texts assessed
Inclusion	Final studies included for qualitative synthesis	91 studies included

The PRISMA-based review process ensured a transparent and replicable selection of literature relevant to the analysis of performance dynamics in PACS. The final set of studies provided the conceptual and empirical foundation for the integrated synthesis, identification of research gaps, and justification of the multidimensional GLOSP framework adopted in this study.

2.5 Classification Framework of Literature Review

Based on recurring themes emerging from prior studies, the literature has been classified into the following interrelated domains:

1. Multidimensional financial performance and associated profitability outcomes of PACS
2. Growth and resource mobilisation dynamics
3. Liquidity management and fund utilisation
4. Operational efficiency and cost management
5. Capital adequacy, financial stability, and solvency
6. Credit recovery and loan management
7. Diversification efforts and allied activities
8. Member participation, governance issues, and institutional factors
9. Policy frameworks and regulatory reforms

Table 2.2 Classification Framework of Review of Literature

Sl. No.	Thematic Area	Focus of Literature	Key Variables / Indicators Examined	Major Findings	Identified Research Gaps
1	Growth and Expansion of PACS	Studies analysing growth of membership, deposits, loans, and business volume	Membership growth, deposit growth, loan growth, business turnover	Growth contributes to outreach but does not necessarily improve profitability.	Growth examined in isolation without linking efficiency or sustainability
2	Liquidity Management	Literature focusing on short-term financial stability of cooperatives	Cash ratio, current ratio, liquidity ratio	Adequate liquidity ensures operational stability, but excess liquidity reduces earnings.	Optimal liquidity–profitability relationship remains unexplored
3	Operational Efficiency	Studies assessing cost management and income generation efficiency	Operating cost ratio, establishment expenses, income–expense ratio	Inefficiency significantly affects surplus generation.	Limited integration of efficiency with other financial dimensions
4	Solvency and Capital Adequacy	Research examining the long-term financial soundness of PACS	Capital adequacy, reserve funds, debt–equity ratio	A weak capital base increases vulnerability and dependence on borrowings.	Solvency rarely linked empirically with profitability outcomes.
5	Profitability Analysis	Studies evaluating surplus generation	Net profit margin, return on assets, return	Profitability varies widely	Treated mainly as an outcome without

Sl. No.	Thematic Area	Focus of Literature	Key Variables / Indicators Examined	Major Findings	Identified Research Gaps
		and financial viability	on working capital	across PACS.	structural explanation
6	Recovery Performance and NPAs	Literature focusing on loan recovery and asset quality	Recovery percentage, overdue ratio, NPA levels	Poor recovery undermines liquidity and solvency	Recovery examined independently without multidimensional linkage
7	Composite Performance Evaluation	Studies using indices and scoring models	Composite indices, weighted scores	Provides holistic evaluation	Lack of standardised cooperative-specific frameworks
8	Governance and Management Factors	Studies on leadership, management practices, and governance	Board effectiveness, managerial efficiency	Governance affects performance indirectly	Quantitative governance indicators largely unavailable
9	Regional and Institutional Studies	Location-specific or state-level PACS studies	Financial and operational indicators	Significant regional heterogeneity exists	Limited comparative and framework-based analysis
10	Policy and Regulatory Perspective	Literature analysing impact of government and regulatory interventions	Subsidies, refinance, policy schemes	Policy support improves outreach but not sustainability	Absence of evidence-based diagnostic policy models

This thematic classification provides analytical synthesis, and directly supports the multidimensional structure of the GLOSP model.

2.6 Analytical Orientation of the Review

Instead of author-wise descriptive approach, this review follows a theme-based analytical structure. Here, the empirical findings are examined collectively to identify dominant trends, converging evidence, conflicting results, and unresolved issues in PACS performance research.

2.6.1 Visual Structure of the Systematic Literature Review

The review structure is visually represented here to enhance clarity, transparency, and analytical coherence in the SLR process. The given diagram summarizes the stages of literature identification, screening, thematic classification, and synthesis used in the present study.

Table 2.3 Systematic Literature Review Framework Adopted for the Study

Step 1	**IDENTIFICATION OF LITERATURE**
Academic journals (JSTOR, Elsevier, Taylor & Francis)	
Doctoral theses (Shodhganga)	
Policy reports (RBI, NABARD, Govt. of India)	
Books and monographs	
Time coverage: 1988–2024	
Step 2	**SCREENING OF LITERATURE**
Removal of duplicate studies.	
Exclusion of non-cooperative banking literature.	
Exclusion of perception-based and non-empirical studies	
Step 3	**ELIGIBILITY ASSESSMENT**
Studies directly related to:	
– PACS / cooperative credit institutions	
– Financial performance / profitability	
– Recovery, efficiency, solvency, liquidity	
Context relevance (India / comparable systems)	
Step 4	**THEMATIC CLASSIFICATION**
Literature grouped into core dimensions:	
–Growth dynamics	

–Liquidity management	
–Operational efficiency	
–Solvency and capital adequacy	
–Profitability behaviour	
–Recovery performance	
–Diversification and governance	
Step 5	**ANALYTICAL SYNTHESIS**
Identification of dominant findings	
Comparison of converging and conflicting results	
Detection of fragmentation and methodological gaps	
Step 6	**RESEARCH GAP IDENTIFICATION**
Absence of integrated multidimensional framework	
Overreliance on isolated indicators	
Limited empirical validation using audited data	
Lack of profitability-dynamics modelling	
Step 7	**FOUNDATION FOR MODEL DEVELOPMENT**
Need for integrated performance evaluation model.	
Conceptual basis for GLOSP framework.	
Direct linkage to Chapter III (Model Development)	

The literature flow framework ensures that the synthesis of prior studies directly informs the conceptualisation of the multidimensional GLOSP model proposed in this research.

2.6.2 Conceptual Gap Mapping from Literature Review

Table 2.4 consolidates the insights emerging from the reviewed studies and clearly delineate unresolved research gaps. Here, the literature is mapped dimension-wise against existing evidence and identified limitations. This conceptual gap mapping provides the analytical foundation for the present study.

Table 2.4 Conceptual Gap Mapping from Existing Literature

Financial Dimension	Major Findings in Existing Literature	Key Limitations Identified	Research Gap Addressed in Present Study
Growth	PACS exhibit expansion in membership, deposits, and loans (Pandey & Kumar; Narayanaswamy; Vijayakumar)	Growth analysed mainly in volume terms; weak linkage with profitability sustainability	Growth evaluated as a structural dimension influencing performance dynamics
Liquidity	Liquidity ratios widely studied; emphasis on fund availability and borrowings	Liquidity treated in isolation; trade-off with profitability rarely examined	Liquidity integrated with efficiency and solvency within a composite framework
Operational Efficiency	DEA and cost ratio studies identify inefficiency and high establishment costs	Efficiency analysed independently; limited interaction analysis	Operational efficiency examined as a transmission mechanism affecting profitability
Solvency	High leverage and weak capital base widely reported	Solvency treated descriptively; not empirically integrated into profitability models	Solvency incorporated as a core determinant of financial sustainability
Profitability	Persistent coexistence of profit- and loss-making PACS documented	Profitability assessed mainly through surplus or ratios	Profitability analysed as a multidimensional outcome variable
Recovery Performance	Overdues and NPAs identified as major weaknesses	Recovery rarely embedded in integrated performance models	Recovery effects captured indirectly through efficiency and solvency indicators

Financial Dimension	Major Findings in Existing Literature	Key Limitations Identified	Research Gap Addressed in Present Study
Diversification	Allied activities improve income stability	Limited empirical integration into financial models	Diversification included through operational efficiency indicators
Methodological Approach	Predominantly descriptive or single-method studies	Fragmented analysis; limited validation	Composite index + panel regression + logit/probit validation
Data Source	Use of survey or partial financial data	Inconsistency and comparability issues	Exclusive use of audited CAMIS data ensures reliability

The conceptual gap mapping clearly indicates that while extensive research exists on individual dimensions of PACS functioning, the literature lacks an integrated, standardised, and empirically validated framework capable of explaining performance dynamics. The gaps identified through the table directly supports the development of the GLOSP model and the empirical strategy adopted in the present study.

2.7 Growth Dynamics and Financial Expansion of PACS

Growth is an important dimension of institutional sustainability in cooperative credit societies. In the context of PACS, growth is reflected through expansion in membership, deposits, share capital, loan portfolio, and working capital. The literature repeatedly states that growth enhances operational scale, improves financial capacity, and strengthens the finance base required for long-term profitability.

Pandey and Kumar (1988) and Mohanan (1991) found the rapid expansion of PACS in Kerala in terms of membership and deposit mobilisation, and stated that this trend is because of the strong community trust and deep rural penetration. These studies emphasised that the growth of PACS reduced dependence on informal credit systems and improved the financial inclusion processes.

Some other studies revealed that growth in volume does not automatically translate into improved profitability. Narayanaswamy (2002) concluded that although several PACS recorded expansion in working capital and loans outstanding, many continued to experience declining net worth due to weak internal capital formation and rising interest burden on borrowed funds. Similar observations were made by Vijayakumar (2016), who found that while PACS in Kerala exhibited steady growth in deposits and loans over a decade, surplus generation remained uneven.

Krishna (2013) noted that policy-led interventions of the government during the mid-2000s temporarily improved growth indicators such as loan issuance and recovery rates. However, the sustainability of such growth is not reflected in efficient internal fund mobilisation mechanisms. Bhattacharyya and Sinha (2021), through a district-level composite index analysis in West Bengal, established that growth indicators alone were insufficient predictors of financial health. The study pointed out the examples of several high-growth societies ranked poorly on profitability metrics.

Some studies revealed the non-linear relationship between growth and financial sustainability. Dongre and Swamy (1999) observed that rapid expansion in loan portfolios alone do not guarantee better profitability. If loan growth is not supported by capital strengthening, it may lead to financial fragility among PACS. Hooda and Chahal (2010) similarly reported that growth in membership and lending volumes weakened the profitability of PACS, due to lack of efficient managerial and recovery capacities. District-level studies by Karnool (2006) and Srinidhi (2017) also confirmed that quantitative expansion without supported by institutional strengthening leads to uneven performance outcomes.

Collectively, the literature affirms that growth contributes positively to institutional strength only when it is accompanied by efficient fund utilisation and recovery management. Expansion without efficiency leads to financial vulnerability, particularly in cooperative institutions where borrowing costs and recovery risks remain high.

2.8 Liquidity Management and Fund Utilisation

Liquidity management occupies a critical position in PACS operations, as these institutions need to maintain adequate liquid resources to meet withdrawal demands from the depositors. On the other side, for the sake of liquidity, PACS cannot restrict deploying funds for income generation. Therefore, the trade-off between liquidity and profitability is often widely discussed in cooperative finance literature.

Narayana Swamy (1997) and Narayanaswamy (2002) observed a disproportionately large share of current assets in the PACS balance sheets. The studies found that, excessive liquidity leads to suppress income potential, and inadequate liquidity often forced societies to depend on high-cost borrowings from apex banks.

Mariappan (2000–01), made a crucial observation on Kerala cooperatives, that improper liquidity planning in PACS frequently resulted in idle funds or mismatched asset–liability structures. Another finding was on over-reliance on short-term borrowings which caused to high interest burden and erosion of operating margins.

Hussain (2007) analysed PACS in Kerala and found that societies with higher deposit mobilisation capacity have relatively better liquidity stability. However, even these societies suffered profitability issues due to inefficient funds management, and rising administrative expenses.

Empirical evidence from broader cooperative and banking contexts also supports the liquidity–profitability relationship. Shah and Mishra (1992) identified weak fund management and institutional deficiencies are the major issues in village cooperatives. Studies by Naidu (2012) and Pakira (2016) reaffirms that excessive reliance on borrowed funds adversely affects net margins. More recent studies, including Devi and Vijayan (2021), finds that weak internal control systems result in poor liquidity management. The studies further caution against improper and inadequate monitoring systems, that such mechanism may lead the societies in fund diversions, delayed reconciliations and poor cash planning.

The literature affirms that the liquidity has a double-sided effect. Even though, liquidity is essential to ensure stability of societies, the inefficient liquidity management may lead to high financial constraints. Therefore, liquidity should be evaluated in a broader dimension integrating its various performance areas.

Institutional studies further highlight that liquidity mismanagement in cooperatives often arises not because of shortage of funds but because of inefficient fund management and poor planning. Shah and Mishra (1992) identified that, weak fund management and financial controls are the main drawbacks of village cooperatives. Studies in broader banking contexts by Naidu (2012) and Pakira (2016) similarly identified that excessive reliance on borrowed funds reduces interest margins and this weakens profitability.

These findings collectively reinforce the existence of a liquidity–profitability connection especially in the context of cooperatives. As per these findings, both excess and scarce liquidity adversely affect financial performance of cooperatives. The literature therefore reinforces the necessity of analysing liquidity not as a static one but as an operationally managed dimension which has impact on income stability and solvency.

2.9 Operational Efficiency and Cost Management

Operational efficiency is one of the most extensively examined dimensions in PACS literature. PACS often face operational issues due to its small-scale nature of transactions, geographically dispersed membership, and labour-intensive operations.

After a thorough organisational subsystem analysis, Shah and Mishra (1992) identified that deficiencies in governance, operations, and environmental linkages are the fundamental causes of inefficiency in village cooperatives. Their framework emphasised that inefficiencies in any subsystem weaken the entire institution.

Empirical studies taken place in later periods using advanced techniques further support this argument. Feroze (2012), conducted the study on district cooperative banks in Kerala, and concluded that, managerial inefficiency is the primary cause of performance gaps. Similar findings were reported by Devi and

Vijayan (2021), on PACS. The findings revealed that, PACS with stronger internal control systems achieved significantly higher efficiency scores.

Sinha and Bhattacharyya (2019), using Malmquist productivity indices, revealed that technological progress played a more decisive role in improving cooperative performance. According to this study, Societies adopting computerisation and improved MIS exhibited superior productivity growth.

Several studies also highlighted the inefficiency of PACS in cost management. Hussain (2007) and Ramachandran (2005) observed that high establishment costs, surplus staffing, and limited business diversification are the main reasons for reducing operating profits. These inefficiencies offset the gains from growth and deposit mobilisation.

Supporting evidence from both Indian and international cooperative contexts further underlines the importance of managerial efficiency. Zakir Hussain (2002) found that workforce productivity is an important factor of institutional performance. Studies by Ramachandran (2005) and Ananth (2009) revealed that inefficient staffing patterns, weak supervision, and delayed decision-making are the causes of poor operational efficiency in PACS. International evidence from Marwa and Aziakpono (2015) and Shamsuddin et al. (2019) similarly confirms that managerial quality and discipline have a stronger influence on efficiency outcomes of PACS.

A number of institutional and field-based studies also highlight the decisive role of managerial efficiency and the ability of human resources in cooperative performance. Zakir Hussain (2002) clearly remarked that profitability of cooperatives is directly linked to employee productivity and administrative discipline.

These studies point out that operational efficiency is an important determinant of cooperative profitability. However, it is to be noted that many of these studies attempted to evaluate the impact and influence of operational efficiency on the performance of cooperatives without examining its interaction with liquidity and solvency dimensions.

2.10 Solvency, Capital Adequacy, and Financial Stability

Solvency is the financial stability of PACS and their ability to absorb operational and credit risks on a long-term basis. Capital adequacy, reserves, debt–equity balance, etc. are the major elements of solvency.

Narayanaswamy (2002) observed that many PACS have insufficient share capital and limited reserves. Because of this, they heavily depend on high-cost borrowings. Thus, a high debt-equity ratio becomes a structural weakness of PACS. Belay et al. (2004) support this finding in their study on Haryana PACS. They could see societies with stronger capital bases demonstrating greater elasticity and operational flexibility. On the other side, highly leveraged societies were found vulnerable to financial issues due to loan defaults.

Several other studies also highlight the adverse impact of excessive leverage on cooperative performance. Swarup (2010) observed that dependence on government capital and other high interest borrowings weaken financial performance of cooperatives. International literature also supports this view. Mathuva and Kiweu (2016) and Towo (2022) indicate that high leverage adversely affects cooperative profitability. Fusco and Migliaccio (2019) found that capital adequacy plays a crucial buffering role during periods of financial stress.

Tiwari (2015) and Naithani (2024) are of the opinion that non-performing assets are the root cause of solvency issues in PACS. They drain the net worth of PACS and decrease capital buffers. These studies point towards the structural inefficiencies of PACS and their consequent impact on the poor performances.

The Task Force on Revival of Cooperative Credit Institutions (2004), noted that the chronic insolvency among PACS is because of the accumulated losses, poor recovery performance, and inadequate governance.

Together, these studies suggest that solvency is a structural determinant of long-term profitability of cooperatives. In this way, the literature emphasises that solvency is both an outcome and a determinant of profitability. However, the

empirical studies rarely attempted to integrate solvency indicators with other determinants of performance.

2.11 Profitability Patterns and Financial Outcomes of PACS

Early studies primary evaluated and compared performance of cooperatives on the basis of profitability indicators such as net profit, gross profit, return on assets, surplus ratio etc.

Niranjan Raj (1998) attributes the profitability of cooperatives to optimal utilisation of funds, controlled operating expenses, and member satisfaction. The study found that in many cooperatives, operating expenses exceed gross margins and this significantly weakens the profitability of PACS.

Hussain (2007) highlighted a remarkable paradox within Kerala PACS. The study found that, many societies are reporting losses even after higher growth in deposits and loans. It was found that the primary reasons for this situation are high administrative costs and rising overdues.

Krishna (2013) observed uneven profitability among PACS even after adopting some revival strategies. Some societies continue their weaknesses in many areas especially in loan recovery. Johnson, N. J., & Paul, D. (2024) reaffirm this point. They found that even though financial growth indicators have strengthened over time, profitability remains volatile among cooperatives. The study points out the reasons for this, towards weak recovery mechanisms and improper fund management.

In short, the literature reveals that performance outcomes of societies are influenced by many factors, and therefore, evaluating their performance with profitability variables alone may give misleading results. However, these studies do not explain why some societies remain in losses while some others functioning in similar environments make profits. The remarks of Katkade (2011) and Karnool (2006) are important – they observed that profitability patterns of societies are strongly influenced by internal management quality.

These findings reaffirm that profitability in PACS cannot be properly evaluated and interpreted with short-term financial results. The performance of PACS must be examined as an outcome of institutional discipline, financial structure, operational behaviour, and management quality over time.

2.12 Interim Synthesis of Core Financial Dimensions

The empirical literature review reveals certain important aspects of financial performance of PACS:

1. Growth alone does not reveal the real performance of PACS.
2. Liquidity is an important factor affecting the performance of PACS, but it is often managed inefficiently.
3. Operational efficiency is essential in converting growth into profitability, but many PACS fail in this aspect.
4. Solvency ensures long-term sustainability, but poor solvency often weakens the performance of PACS.
5. Profitability of PACS is an important indicator that reflect the financial result of societies, but it alone cannot reflect the multidimensional performance dynamics of PACS.

Importantly, the literature largely discusses the role and relevance of various dimensions of performance of PACS- such as growth, liquidity, operational efficiency, and solvency. However, these discussions often examine these factors independently. This leads to isolated examinations and explanations. The studies which make an integrated evaluation of all these factors can only bring in more reliable results. Because, the performance of PACS should be understood as the result of the interaction of various factors influencing them. Unfortunately, such studies and attempts are lacking.

2.13 Loan Management and Credit Recovery

Numerous studies have discussed loan management and credit recovery as the primary issues of PACS. Literature in the cooperative performance studies have continuously identified poor credit recovery as the major factor behind the financial distress of PACS.

The Khusro committee (1986) studied overdue problems in cooperative credit societies and commented that important reasons are inadequate loan management, weak legal enforcement, and politically influenced loan policies. Viswanath (2001) also found the same issue in credit societies, and commented that absence of post disbursement monitoring of loans, is the major reason behind the issue.

Sasikumaran Nair (2002) revealed that poor repayment discipline, political interference, and expectations of loan waivers destabilised the credit culture. He added that a substantial proportion of defaults were due to genuine agricultural distress, but still a major share was due to unnecessary institutional leniency.

Mazumdar et al. (2014) found some regional disparities in recovery performance. The study revealed that southern states show better recovery ratios compared to northern and northeastern regions. As per the study, the disparities in performance are because of the differences in staff training levels, borrower monitoring mechanisms, and agricultural income stability. Singh and Dangi (2022) observed that the diversification efforts of PACS, particularly conversion into multi-service centres, has helped to bring in modest improvements in recovery performance. However, recovery issues continue in many PACS as a main reason behind the financial distress.

Recovery management is consistently emphasised as the most critical determinant of PACS' sustainability in almost all empirical studies. Bhaskaran and Josh (2000) found that weak practical strategies of NPA management is the reason for poor recovery performance in cooperative institutions. Field-level evidence from Poonam (2005) and Ghosh et al. (2018) also supported this view. Studies such as Vishnu and Selvanayaki (2018) empirically proved that there exist strong inverse relationships between NPAs and profitability. This signifies the role of recovery efficiency in performance dynamics. Onah et al. (2024) pointed out the need for financial literacy and repayment structuring in reducing the repayment issues in cooperatives.

Collectively, these studies establish that weak recovery performance causes multifaceted problems for the cooperatives—it reduces interest income, weakens

capital base and liquidity, and aggravates solvency stress. At the same time, these studies reaffirm the importance of recovery efficiency as a dominant determinant influencing liquidity, solvency, and profitability. However, recovery performance is often studied independently, and it is rarely examined as an integrated component of performance dynamics.

2.14 Diversification and Allied Activities

Diversification of PACS with allied and non-credit activities has been strongly recommended as a strategy for income generation of PACS. Such activities are considered as extra source of income, and they will help PACS to reduce dependence on traditional agricultural lending and higher-cost borrowings.

Belay et al. (2004) identified increasing emphasis on non-agricultural loans in the loan portfolio of PACS. Even though it is a structural shift in the preferences of PACS, it will help them in reducing income volatility, particularly during periods of agricultural distress. Manoj (2010) and Hooda and Chahal (2010) support this view. These studies argued that exclusive dependence on crop loans leads PACS to systemic risks. Diversified and allied activities are alternate mechanisms for income generation.

Again, empirical evidence from Naithani (2024) revealed that diversified income streams contributed five to ten percent of total income in Uttarakhand PACS. Such allied sources can significantly improve the surplus generation ability of PACS. Similarly, Shinde et al. (2020) conclude that societies engaged in allied activities show better financial viability even amidst modest recovery challenges.

However, the literature warns against diversification without managerial capability and internal controls. Diversification without proper planning and management control may lead to operational problems. Studies by Bhosale (2005) and Vasuki (2019) emphasize that poor planning and control may adversely affect the effectiveness of allied activities.

Several other studies also have identified the significant role of diversification in PACS. Guruprasad and Umesh (2015) observed better financial results among the societies engaged in non-credit services even during periods of agricultural

depression. Sarkar and Sahu (2000) emphasised that diversification aligned with member needs can strengthen both income generation and institutional relevance of PACS.

Shailaja and Hebbar (2018) further noted that diversification enhances rural financial inclusion initiatives. International evidence from Castilla-Polo et al. (2018) suggests that innovation and service diversification positively influence cooperative financial outcomes. However, they pointed out the necessity of managerial efficiency to attain the results. These findings collectively support diversification as a complementary, profitability strategy. In short, diversification and allied activities can contribute to the profitability of PACS, if supported by governance capacity and operational efficiency.

2.15 Governance, Member Participation, and Democratic Functioning

Cooperative governance is a widely discussed area in cooperative literature. These institutions are managed through democratic way. Because of this, political organisations and associations occupy significant role in cooperative management. Therefore, people services may get preference over financial outcomes in management decisions. Several studies identify governance quality as a decisive factor influencing financial outcomes.

Shah and Mishra (1992) commented that cooperative performance is a function of interlinked subsystems, and governance has the coordinating role. Weak governance therefore brings in inefficiencies across operations, recovery, and financial management. But, Niranjan Raj (1998) and Meetei (2000) pointed out the relevance of member participation in cooperative management. Members' involvement can enhance accountability and financial discipline. PACS with active involvement of members always demonstrate better repayment behaviour and fund utilisation capabilities.

Sujith and Sumathi (2019) observed that loan procedures and transparency increase member satisfaction in Kerala PACS. The study further emphasises that, this satisfaction, in turn, influences repayment discipline. Tripathy et al. (2021) supported

this view, adding that participatory decision-making and governance transparency improve institutional credibility.

On the other hand, numerous studies consistently cite political interference as a limiting factor in managerial efficiency. Studies by Hussain (2007) and Ramachandran (2005) revealed that politically motivated lending and recovery practices existing in PACS significantly weaken financial discipline. Swarup (2010) observed that the accountability and recovery discipline weakened due to excessive state intervention in the management of PACS.

International cooperative research by Shamsuddin et al. (2019) and Towo (2022) further emphasizes the effectiveness of management in ensuring PACS's positive financial performance. These findings emphasize that governance is not the only factor in cooperative performance but is also an enabling mechanism that influences growth efficiency, recovery behaviour, and profitability.

2.16 Policy Framework, Regulatory Environment, and Institutional Reforms

The policy environment is the other significant influencer on the performance of PACS. This is why the Vaidyanathan Committee and the Task Force on the Revival of Cooperative Credit Institutions (2004) suggested recapitalisation and governance reforms to address accumulated losses. However, later studies opined that recapitalisation can only bring short-term improvements to the balance sheet; it has a limited long-term impact on profitability. The structural issues, such as inefficient operations, weak recovery culture, and limited diversification, cannot be resolved with this strategy.

The introduction of the Banking Regulation (Amendment) Act, 2020, extended regulatory oversight to cooperative banks. Similarly, the establishment of the Ministry of Cooperation in 2021 caused to renewed policy focus on cooperatives. Various committee reports on cooperatives also advocate digitisation, core banking integration, and transformation of PACS into multi-service centres. However, empirical assessment of the influence of these reforms remains limited.

2.17 Regional and Socio-Economic Influences

Several studies emphasise that the regional socio-economic conditions influence the performance of PACS. Mohanan (1991) and Jugale & Dodkey (1998) found that Kerala's unique cooperative culture is because of social trust and consequent participation in deposit mobilisation.

However, regional imbalances continue even within Kerala. Variations in cropping patterns, population density, and political influence generate differential financial outcomes among societies. Mazumdar et al. (2014) and Sarkar et al. (2022) confirmed that regional factors significantly influence recovery performance of PACS. These findings emphasise the importance of evaluating PACS within a controlled regional framework.

2.18 Integrated Synthesis of Literature

The systematic review of literature reveals that the performance of cooperative financial institutions, particularly PACS, is multidimensional in nature. This has been proved by many studies across diverse institutional and regional contexts over the years. These studies establish that the performance of PACS is the result of the interaction of multiple financial and operational dimensions. It means that the performance of these cooperatives cannot be effectively explained through single-outcome measures. To get the real picture of performance all dimensions of PACS – such as growth, liquidity management, operational efficiency, and solvency need to be evaluated. Therefore, profitability alone cannot reflect the real picture of PACS.

The literature reveals that growth-oriented expansion, does not mean improved performance. Several studies pointed out that, in many PACS, rapid expansion of business volume and membership are accompanied by declining asset quality, and rising overdues. This suggests that growth, without effective cost control, and sound solvency management, may weaken cooperative performance.

Liquidity management has been widely identified as a critical determinant of short-term operational stability. Liquidity can absorb short term financial shocks. Empirical studies consistently emphasise that weak liquidity positions constrain

lending capacity and intensify dependence on external borrowing. These high-cost external borrowings increase the risk of financial distress.

Similarly, operational efficiency is also an important factor of cooperative performance. Operational efficiency is related to cost control, recovery performance, and income generation capacity in PACS. Operational inefficiencies lead to persistent losses and the erosion of working capital even in institutions with substantial operational scale.

Solvency-related factors get comparatively less attention in cooperative literature. However, the available literature emphasises the role and relevance of solvency factors in determining long-term institutional performance. Many studies have pointed out the significant influence of high leverage, inadequate capital buffers, and unfavourable asset structures on the increased vulnerability of cooperatives. However, these studies do not claim that solvency factors alone can determine the profitable performance of PACS. Instead, solvency factors have influences on the profitability and overall performance of cooperatives. Together, these findings suggest that cooperative performance must be understood as the outcome of dynamic interactions of various factors. Growth behaviour, liquidity discipline, operational efficiency, and solvency strength have influences in the performance of PACS.

Importantly, the synthesis reveals that profitability occupies a substantial role within this framework. Rather than serving as a comprehensive measure of performance, profitability should be considered as an outcome indicator reflecting the effectiveness of underlying performance dimensions. Several studies report cases where cooperatives achieve short-term profitability despite weak structural fundamentals. Similarly, some other studies show the instances of temporary losses coexist with strong institutional capacity. Such divergence in the performance of PACS reinforces the limitation of profit-centric evaluation approaches. This highlights the need for a multidimensional diagnostic approach.

Overall, the synthesis of literature points to the need for a unified analytical framework to assess the performance dynamics of PACS in a comprehensive and systematic manner. From the literature it is very clear that the existing studies focus

on individual dimensions, and do not integrate these components into an interconnected explanatory model. This gap provides the conceptual justification for adopting a multidimensional performance framework, which examines the interaction of growth, liquidity, operational efficiency, and solvency, and analyses profitability as a resultant outcome.

2.19 Research Gaps Identified from Literature

The review of existing literature reveals several critical gaps in the analysis of cooperative financial institutions, particularly in the context of PACS. Although a substantial number of researches examine various aspects of cooperative functioning, the findings remain fragmented across dimensions, methodologies, and outcome variables. These gaps limit a comprehensive understanding of the performance dynamics or financial outcomes of PACS.

First, a major conceptual gap lies in the absence of an integrated framework for analysing the performance dynamics of PACS. Most studies focus on isolated dimensions such as growth, liquidity, efficiency, or solvency to examine the performance of PACS. Some others rely on profitability as a single indicator of success or failure. Such approaches fail to capture the interactive and dynamic nature of cooperative performance. These studies do not consider the multiple financial and operational dimensions, and their joint influence on outcomes. The literature lacks a unified analytical framework that systematically integrates these dimensions. They do not explain variations in performance across societies operating under similar institutional conditions.

Second, there exists a methodological gap in the treatment of profitability within cooperative performance studies. While profitability is frequently used as a primary measure of performance, it is rarely analysed as an outcome of underlying performance processes. These studies fail to explain how growth behaviour, liquidity management, operational efficiency, and solvency strength influence financial outcomes. There is limited empirical work that explicitly positions profitability as a resultant variable emerging from multidimensional performance dynamics.

Third, the literature exhibits limited attention to the dynamic interaction among performance dimensions over time. Many studies rely on cross-sectional analysis but do not capture structural differences across institutions and temporal variation in performance outcomes. As a result, the distinction between short-term financial fluctuations and long-term institutional capacity remains unexplored.

Fourth, despite the prominence of PACS in India's cooperative credit structure, region-specific studies that adopt a comprehensive performance dynamics perspective remain scarce. Existing research on PACS in Kerala largely emphasises descriptive trends, regulatory issues, or isolated financial indicators. This restricts the applicability of findings for diagnostic and policy-oriented analysis.

Finally, the literature reveals a gap in translating multidimensional performance assessment into a diagnostic tool capable of assessing the structural differences among PACS. Most studies stop at identifying determinants or reporting financial outcomes, without offering a systematic mechanism to classify institutions based on their performance dynamics. This limits the usefulness of existing research for targeted policy intervention and preventive governance.

Form this review it is very clear that, there is the need for a systematic, multidimensional framework that integrates growth, liquidity, operational efficiency, and solvency to analyse the performance dynamics of PACS, while treating profitability as an outcome variable. Addressing these gaps forms the main purpose of the present study.

The conceptual foundation for the analytical framework and methodology adopted in the study are discussed in the subsequent chapters.

2.20 Justification for the GLOSP Model

The research gaps identified in the preceding section emphasise the need for a comprehensive analytical framework capable of evaluating the multidimensional and dynamic nature of performance in PACS. Existing studies, either focus on individual performance dimensions or rely excessively on profitability as a standalone indicator. Such approaches are inadequate for explaining the divergent financial trajectories

observed among PACS. Addressing this limitation requires a framework that systematically integrates key performance dimensions and examines their collective influence on financial outcomes.

In response to this need, the present study adopts the GLOSP model, which conceptualises performance as a multidimensional construct encompassing growth, liquidity, operational efficiency, and solvency. These dimensions are selected based on consistent empirical evidence in the literature identifying them as critical determinants of cooperative stability and sustainability. As per these studies, growth reflects the expansion capacity of PACS, liquidity means short-term financial resilience, operational efficiency represents cost and income management capability, and solvency denotes long-term financial strength. Together, these dimensions provide a holistic representation of the financial–institutional performance of PACS.

The GLOSP model is explicitly designed to treat profitability as an outcome variable rather than an intrinsic component of performance measurement. This distinction addresses a major methodological gap in existing research, where profitability is examined in isolation. By excluding profitability from the construction of the performance index and analysing it separately as a dependent variable, the model enables a clearer examination of how underlying performance dynamics translate into financial surplus or loss.

Methodologically, the GLOSP framework facilitates the standardisation and aggregation of heterogeneous financial indicators into dimension-wise indices and a composite performance index. This approach allows for meaningful comparison across PACS with differing scales of operation. Furthermore, the framework supports both cross-sectional and panel-based analysis, enabling the study to distinguish between short-term variations in financial outcomes and long-term structural differences across institutions.

Importantly, the GLOSP model functions not merely as a measurement tool but as a diagnostic framework capable of differentiating PACS based on their underlying performance dynamics. By linking composite performance scores with profitability outcomes, the model enables classification of societies into meaningful

categories. This helps the management in targeted policy intervention and preventive governance. The adoption of the GLOSP model thus directly addresses the conceptual and methodological gaps identified in the literature.

2.21 Chapter Summary

This chapter presented a systematic review of empirical, theoretical, and policy-oriented literature relating to the performance dynamics of PACS. The review synthesised existing fragmented literature which largely characterised by single-factor analytical approaches. Further, the critical assessment of prior studies revealed the absence of integrated multidimensional frameworks capable of capturing the structural and operational interdependence underlying cooperative financial performance.

Taken together, the literature synthesis and theoretical integration provide the intellectual basis for the present study. It also justifies the development of the GLOSP framework as a structured, empirically grounded model for assessing institutional performance. In addition to empirical synthesis, the theoretical mapping in the following chapter clarifies the intellectual positioning of the research and demonstrates the conceptual necessity of adopting a multidimensional analytical framework for evaluating cooperative institutions.

Chapter 3

THEORETICAL FRAMEWORK AND THE GLOSP MODEL

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CHAPTER III

THEORETICAL FRAMEWORK AND THE GLOSP MODEL

3.1 Introduction

This chapter presents the theoretical foundations to the present study and explains the conceptual framework of the GLOSP model for analysing the performance dynamics of PACS in Kerala. The chapter begins with a discussion on the cooperative movement and the evolution of cooperative credit in India, followed by an examination of the organisational and functional characteristics of PACS. Based on this foundation, the chapter presents the GLOSP framework and explains its conceptual structure, theoretical foundations, dimensional components, and diagnostic orientation.

3.2 Conceptual Foundations of the Cooperative Movement

The cooperative movement emerged as a solution to the social economic issues prevailed in the society such as, economic inequality, rural indebtedness, problems in raising formal credit etc. faced by rural and marginalised communities (Lele, 1981). Basic philosophy of the movement - self-help through mutual help, economic participation, social equity, and community welfare – were widely accepted among these communities (Birchall, 2011). The service oriented democratic approach of the cooperatives prioritise service delivery and member benefit over profit maximisation (Clark et al., 2014).

The basic motto of cooperatives is *'self-help through mutual help'* and this highlights individual and collective responsibility of members in every aspect. The core cooperative principles include, voluntary and open membership, democratic member control, member economic participation, autonomy, education, cooperation among cooperatives, and concern for community (ICA, 2015). These principles are the guidelines as well as policy framework of the cooperative institutions across sectors and regions.

In the context of credit cooperatives, they mobilise community resources and extend credit based on trust, proximity, and shared responsibility (ILO, 2016). Scholars opine that cooperative institutions combine economic efficiency with social objectives, thereby contributing to inclusive development and financial stability (Münkner, 2013). Therefore, any evaluation of cooperative performance must recognise that financial outcomes are not the end of cooperatives, but serve only as instruments for institutional sustainability.

3.3 Evolution of Cooperative Credit in India

The cooperative movement was introduced in India with the enactment of the Cooperative Credit Societies Act, 1904. The main purpose of this Act was to provide affordable credit to farmers through member-owned societies (Government of India, 2004). At that time the rural people in India were suffering from a number of economic and financial problems including widespread rural indebtedness and the dominance of informal moneylenders. Government introduced cooperatives as a people oriented solution to these issues (Shah et al., 2007). However, the cooperatives are functioning in India, strictly following cooperative principles with local participation and mutual responsibility.

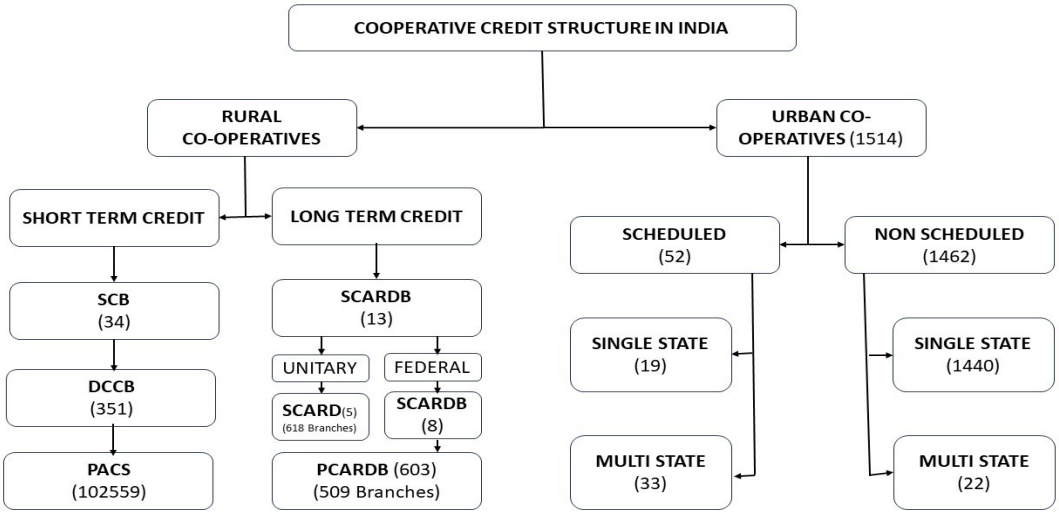
Later, The Cooperative Societies Act was expanded with some amendments in 1912. With this new Act, the scope of cooperative institutions extended beyond credit, to agricultural and non-agricultural sectors. After independence, cooperative credit institutions became an integral component of India's planned development strategy, particularly in agricultural and rural development (RBI, 2006). The establishment of the RBI and later the NABARD multiplied the growth speed of cooperatives with refinancing, supervision, and policy support (GA et al., 2021).

Even though cooperatives were widely accepted by the people of India, theses societies struggled with many structural and operational problems from the very beginning itself. Major committees, including the All-India Rural Credit Survey Committee (1954), the Committee on Cooperative Credit (1969), and the Vaidyanathan Committee (2005), consistently reaffirmed the crucial role of cooperatives in rural credit. At the same time, these committees pointed out the

structural weaknesses of societies related to governance, recovery performance, and financial sustainability (RBI, 2006; NABARD, 2018). Even with the regular efforts from the government side, cooperatives continued to perform badly. Still these societies play dominant role in rural credit and policy implementation. Policy reforms in the post-2000 period increasingly focused on revitalisation, professional management, and transparency within the cooperative sector (Dawes, 2008). Despite the expansion of commercial banking and regional rural banks, cooperative credit institutions continue to serve as critical grassroot level financial intermediaries (Sonker, 2019).

3.4 Structure of the Cooperative Credit System

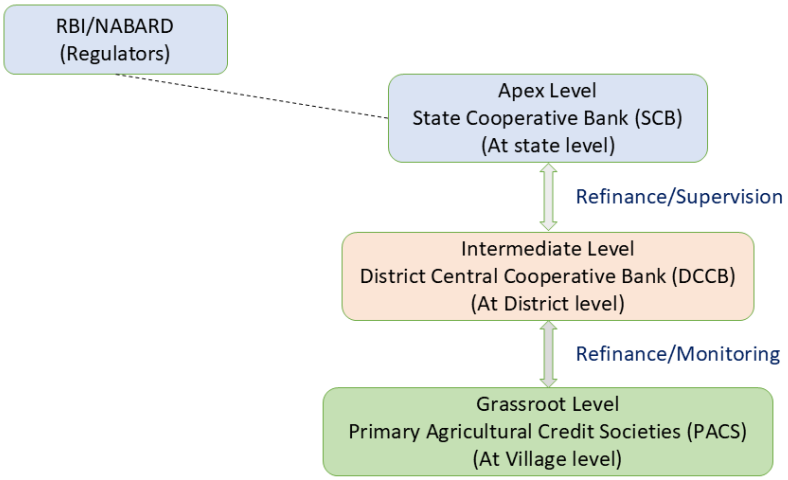
The cooperative credit system in India has a multi-tier structure as shown in chart 3.1.



Source: Annual report 2022-23, Ministry of Cooperation, Government of India

Chart 3.1 Cooperative Credit Structure in India

The chart shows that, cooperative credit societies are primarily divided into rural and urban societies. The rural societies are further divided into short-term and long-term societies. The short-term cooperative credit consists of State Cooperative Banks at state level, District Central Cooperative Banks at the district level, and PACS at the grassroots level (RBI, 2021). This hierarchical arrangement facilitates mobilisation of resources, and ensures refinancing, and credit flow to rural borrowers (Government of India, 2020). Chart 3.2 shows this hierarchical arrangement clearly.



Source: NABARD (2024). Annual Report 2023-24. https://www.nabard.org/annual-report/index.html

Chart 3.2 Short-Term Cooperative Credit Structure in India

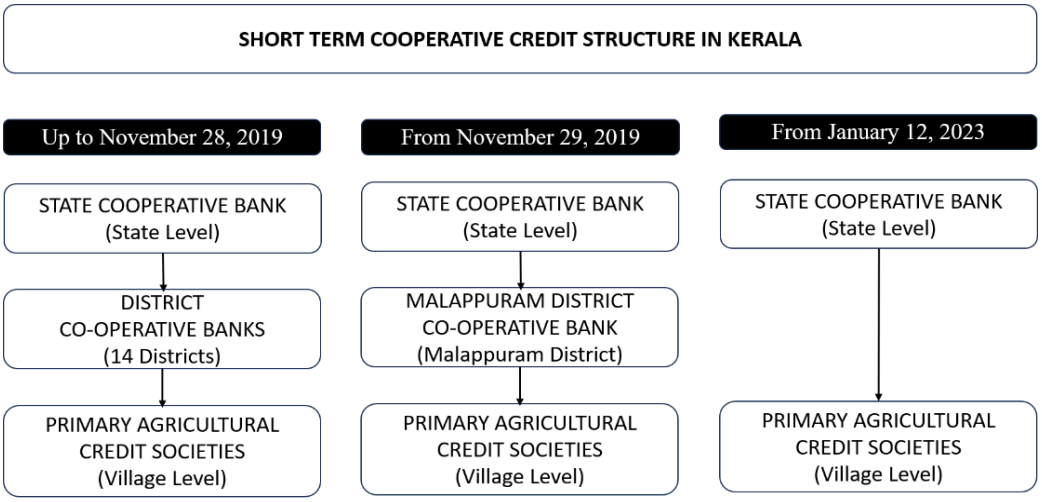
Within this structure, PACS function as the primary level institutions connecting credit system to rural people (NABARD, 2023). The effectiveness of cooperative system therefore significantly depended on the performance of PACS.

3.5 Cooperative Credit in Kerala

Kerala has exhibited a strong cooperative culture on all times, particularly in rural and agricultural credit operations. No part of the state is untouched by cooperatives. The cooperative network in the state thus demonstrates with higher household participation and broad regional outreach (Isaac, 1986; Tripathy et al., 2021a). Cooperative credit institutions in Kerala have significant role in agricultural financing, rural savings mobilisation, and implementation of development schemes.

The success of cooperative credit in Kerala has many reasons. Strong community participation, effective management practices, supportive regulatory environment etc. are some of the reasons (Solomon, 2023). Additionally, the advancement of state on education, social welfare, and decentralised governance have contributed to the success and resilience of the cooperative movement. The cooperative credit societies in Kerala, always move along with the government in the programmes for poverty alleviation, rural empowerment, and social cohesion (Solomon, 2023).

Co-operatives are having great relevance and significance in India because they are inspired by the principles of self-help and equality (Madan, 2007). PACS form the base level of short-term co-operative credit structure, and play a vital role in the financial inclusion of rural population. Unlike other states in India, people in Kerala have a higher dependency on co-operative credit institutions by having about 60% of its total population as members of PACS. Strengthening these institutions is vital for ensuring a strong foundation for the newly formed Kerala Bank because the district and state co-operative banks rely more on PACS for their deposits and advances. (Sekhar & Vijayan, 2021)



Source: Economic Review 2023, Kerala State Planning Board

Chart 3.3 Short-Term Cooperative Credit Structure in Kerala

The Economic Review, Kerala (2023) reveals that "the co-operative credit structure in the state comprises short-term, medium-term, and long-term credit. The short-term rural credit structure in Kerala consists of State Cooperative Bank at the state level, District Cooperative Banks at the district level, and Primary Agriculture Credit Societies at the village level. Chart 3.3 shows that, up to November 28, 2019, the State had the Kerala State Co-operative Bank at the state level and 14 District Co-operative Banks at the district level. On November 29, 2019, the Registrar of Co-operative Societies issued an order for the amalgamation of 13 District Co-operative Banks with Kerala State Co-operative Bank, based on the resolutions passed by the General Bodies of the respective District Co-operative Banks as provided under

section 14A of the KCS Act. With this, from November 29, 2019, the short- and medium-term agricultural credit structure consisted of The Kerala State Co-operative Bank (Kerala Bank) at the state level and 1 District Co-operative Bank (Malappuram District Cooperative Bank) and 1643 PACS including FSS at the bottom level."

Later in January 2023, the Kerala government completed the procedures of merging the Malappuram District Cooperative Bank with the Kerala Bank. In continuation of the Amendment of Kerala Cooperative Societies Act 74 (H), the erstwhile Malappuram District Cooperative Bank merged to Kerala Bank as per the Final Order of the Registrar of Cooperative Societies, Vide CB (5) 6394/2020 dt. 12.01.2023. Thus, from January 12, 2023, the short-term cooperative credit structure in Kerala has only two tiers (KP, 2023). "The Kerala Bank at the apex level and PACS, including Farmers Service credit Society (FSCS) at the bottom-level" (Planning Board, Economic Review, 2022)

3.6 PACS: Institutional Overview

PACS are village-level cooperative institutions established to provide short-term and medium-term credit to farmers and rural members. They mobilise deposits, distribute institutional credit, implement government-supported schemes, and increasingly engage in diversified economic activities (NABARD, 2022). PACS operate within defined geographical areas and are characterised by local membership and democratic governance (Tripathy et al., 2021).

Table 3.1 Functional Characteristics of PACS

Aspect	Description
Area of Operation	PACS operate at the village or panchayat level within a clearly demarcated geographical jurisdiction, enabling close interaction with members and familiarity with local socio-economic conditions.
Membership	PACS follow the principle of voluntary and open membership. Members of PACS mainly include farmers, agricultural labourers, and rural households. PACS follow democratic management based on one-member–one-vote. Therefore, the

Aspect	Description
	general body consisting of members have the ultimate authority over the functioning of PACS.
Sources of Funds	Funds are mobilised through member share capital, reserves, deposits from members and non-members (where permitted), borrowings from Apex Banks, and refinance support from NABARD.
Credit Functions	PACS provide short-term and medium-term agricultural loans, crop finance, allied activity credit, consumption loans, and increasingly non-agricultural credit to meet diversified rural financial needs.
Developmental Services	PACS also engage in agricultural input distribution, implementation intermediaries of government-sponsored schemes, financial inclusion initiatives of RBI, rural development programmes of NABARD etc.

Source: Compiled by the researcher from the cooperative literature.

Beyond credit delivery, PACS act as instruments of financial inclusion and rural development programmes of RBI and NABARD (World Bank, 2020). Therefore, the sustainability of cooperative credit institutions, especially the PACS, is very essential not only for financial stability but also for socio-economic welfare in rural areas (Mohan, 2006).

3.7 Governance and Management Structure of PACS

PACS are democratic institutions based on the principle of one-member–one-vote. The general body of members is the supreme authority, while the managing committee, elected from among members, is responsible for policy formulation, operational control, and financial decision-making (ICA, 2015). Day-to-day administration is carried out by the secretary or manager under the supervision of the committee. Secretary is the executive authority in societies (Sumaya, 2021).

The governance structure of PACS plays a crucial role in the financial performance and operational decisions. Studies highlight that professionalism in leadership, transparency in decision-making, accountability mechanisms etc. are highly significant in loan management, loan recovery, cost control, and operational efficiency of PACS (Cuevas & Fischer, 2006). However, political interference, limited managerial capacity, inadequate professionalism etc. adversely affects the governance quality in many societies (RBI, 2021).

Governance structure has significant roles in ensuring operational efficiency, recovery performance, and long-term sustainability of cooperatives (RBI, 2020). Weak governance often leads to poor monitoring, delayed decision-making, and inadequate financial control. Unfortunately, many PACS in the country are facing such issues (Birchall, 2014). Therefore, strengthening the governance structure is very essential for improving institutional discipline and long-term viability of PACS.

3.8 Financial Operations and Accounting Framework of PACS

PACS function at village level, and therefore responsible for mobilising rural savings and providing short-term and medium-term credit to the rural people. The financial operations of PACS primarily include collection of share capital, mobilisation of deposits, borrowings from Apex Banks, and disbursement of agricultural and allied loans. Some PACS are operating consumer stores, fertilizer depots, medical shops etc. However, income is largely derived from interest on loans, service charges, and commission from government-supported credit schemes. Expenditure of PACS mainly consists of administrative costs, interest on borrowings, operational expenses (NABARD, 2022).

The accounting framework of PACS is strictly based on the prescribed cooperative accounting standards issued by state cooperative departments and NABARD. Financial statements of PACS include the balance sheet, profit and loss account, and schedules detailing assets, liabilities, income, and expenditure. In order to ensure transparency, financial discipline, and regulatory compliance, annual audit has been made compulsory for cooperatives (RBI, 2021). In Kerala, audit of PACS is conducted by special auditors appointed by the Registrar of Cooperative Societies. Even though professional accounting qualifications are not mandatory for such

auditors, generally efficient and experienced employees are assigned with this task. These audited accounts are the basis for performance assessment, supervision, and eligibility for refinancing support.

Accounting and auditing practices followed by PACS are crucial for their evaluation and assessment. According to ICA, the accounting framework is the quantitative foundation for performance analysis and systematic measurement of financial behaviour of PACS (ICA, 2015). Government is seriously considering some improvements in the area - such as standardisation of accounting practices and digitisation of financial records to enhance reliability and comparability across societies (Government of India, 2023). Accurate accounting and timely audit are necessary to evaluate financial health, diagnose operational weaknesses, and to strengthen the institutional sustainability of PACS.

3.9 Conceptual Issues in Evaluating PACS Performance

Performance evaluation of PACS involves certain conceptual challenges because of their cooperative character and developmental mandate. PACS function basically in a service-oriented framework in which financial surplus is intended to sustain operations rather than maximise returns (ICA, 2015). Their financial operations are depended on the agricultural environment of the area, and rural household needs. Therefore, the financial outcomes are often influenced by seasonal agricultural cycles, policy-driven interest subvention schemes, and recovery risks associated with crop uncertainty (RBI, 2021). Additionally, substantial variation among PACS especially in size, membership composition, operational capacity etc. limits the accuracy and effectiveness of single-ratio or profit-based assessment methods (NABARD, 2022). These institutional complexities reveal the limitations of existing evaluation strategies, and necessitate a multidimensional and context-sensitive approach for the performance evaluation of PACS.

3.10 Limitations of Conventional Evaluation Approaches

Traditional strategies for evaluating the performance of PACS are statutory audit classification, surplus–deficit analysis, and selected financial ratios (Baldacchino et al., 2016). These strategies are the approved mechanisms for performance evaluation, and therefore serve regulatory and compliance purposes.

However, they provide limited insight into the underlying causes of performance variation across societies. Audit-based classification is the widely accepted strategy adopted by the department to classify the PACS (RBI, 2021). This method primarily reflects accounting outcomes at a point in time, and does not adequately consider the structural weaknesses of PACS related to liquidity management, operational efficiency, or capital adequacy.

Ratio analysis is also used as an important method of performance evaluation of PACS. These ratios often ignore the interdependence of growth, liquidity, efficiency, and solvency dimensions of PACS, and generally calculate and examine indicators in isolation (NABARD, 2022).

The CAMEL framework is the other method used in certain studies to assess the financial performance of PACS. CAMEL framework is originally meant for commercial banking institutions, and therefore not fully suited to cooperative entities. Cooperatives are different from commercial banks in many aspects such as ownership structure, governance, and service orientation (Berger & Humphrey, 1997; Cuevas & Fischer, 2006).

In short, the traditional approaches and techniques used for performance evaluation of PACS lack diagnostic depth and dynamic perspective in many aspects, and these are not capable of integrating various dynamic factors of cooperative nature. This situation underscores the need for an integrated and institution-sensitive performance evaluation framework for PACS.

3.11 Need for a Multidimensional Performance Framework

The limitations of conventional performance assessment methods, and lack of suitable effective performance evaluation tool for PACS, necessitate the need for a multidimensional framework capable of capturing the complex functioning of PACS. As it is definite that the performance of PACS is the result of the interaction of multiple financial dimensions, including growth capacity, liquidity adequacy, operational efficiency, and solvency strength, there must be an effective mechanism to integrate the special requirements of cooperatives (RBI, 2021). Evaluating these

dimensions in total is essential to explain sustainability and resilience of PACS over time.

Cooperatives need composite and dimension-based assessment frameworks. Because such framework can provide deeper diagnostic insight into institutional performance dynamics (OECD, 2008). Cooperative institutions are region specific institutions with heterogeneous scale and developmental mandates, and therefore, only a multidimensional approach can make balanced evaluation and meaningful comparison (NABARD, 2022). Such a framework is also essential for understanding profitability behaviour of PACS within the broader context of institutional stability.

3.12 Introduction of the GLOSP Model

With a view to overcome the limitations of traditional performance evaluation approaches and to meet the need for a multidimensional analytical perspective, the present study presents an empirically derived GLOSP framework. This framework makes an integrated approach for assessing the performance of PACS. The model is developed on four core institutional dimensions: *Growth, Liquidity, Operational Efficiency, and Solvency* - and conceptualises profitability as an outcome variable. The framework is built on these dimensions, as these collectively reflect the short-term operational capacity and long-term financial sustainability of PACS (OECD, 2008; RBI, 2021). The suggested framework makes the composite evaluation, by combining dimension-wise assessments. Thus, the GLOSP framework enables systematic comparison, diagnostic interpretation, and performance benchmarking across PACS. Moreover, the framework is structured to align with cooperative principles by emphasising institutional objectives rather than profit maximisation alone (ICA, 2015).

3.13 Theoretical Basis of GLOSP Dimensions

The GLOSP framework is constructed on the established financial and institutional theories that emphasise the multidimensional nature of organisational performance.

The growth dimension refers to the expansion of PACS in terms of membership, deposits, and lending capacity (NABARD, 2022). Growth in membership, deposits and loans shows the increased ability of PACS to serve the members efficiently and effectively.

Liquidity is the ability of PACS to meet short-term obligations and maintain operational continuity (Constantin & Loredana, 2012). Liquidity is highly significant for PACS due to seasonal credit demand and withdrawal patterns associated with agricultural cycles (RBI, 2021). Insufficient liquidity disrupts service delivery, performance quality and timely assistance.

Operational efficiency reveals how the PACS utilises the human and non-human resources (Obiki- Osafiele et al., 2024). Efficiency of PACS is reflected in cost control, recovery performance, and portfolio quality (IMF, 2022). Operational inefficiencies lead to rising costs and weakening profitability.

Solvency is the long-term financial strength of institutions ensuring adequate owned funds and controlled leverage (Obiki-Osafiele et al., 2024). Capital adequacy and solvency are essential to absorb financial shocks and to maintain institutional resilience (BIS, 2021).

In this context, profitability is viewed as an outcome indicator emerging from the balanced interaction of these dimensions, rather than an isolated performance criterion.

The GLOSP model developed in the present study is thus grounded in established economic and institutional theories relevant to cooperative financial institutions. Each dimension of the model is based on a distinct theoretical perspective which explain the functioning, sustainability, and performance of PACS.

The consolidated view of the theoretical foundations of the proposed GLOSP model is summarised in Table 3.2.

Table 3.2 Theoretical Basis of GLOSP Dimensions

GLOSP Dimension	Theoretical Perspective	Core Theoretical Argument	Relevance to PACS Performance
Growth	Growth Theory and Institutional Development Theory	Institutional expansion in terms of membership, deposits, and lending enhances outreach and scale of operations	Explains expansion of business volume and financial outreach of PACS
Liquidity	Liquidity Preference Theory and Financial Stability Theory	Adequate liquidity is essential for meeting short-term obligations and maintaining depositor confidence	Ensures operational continuity and financial stability of PACS
Operational Efficiency	Efficiency Theory and Cost Management Theory	Efficient utilisation of resources and cost control improves surplus generation	Determines income–expenditure balance and operating sustainability
Solvency	Capital Adequacy Theory and Financial Resilience Theory	Strong capital base enhances loss absorption capacity and long-term stability	Reduces vulnerability arising from excessive borrowings and financial shocks
Profitability	Institutional Sustainability Theory	Profitability represents the cumulative outcome of balanced financial performance	Reflects long-term viability rather than short-term gains

Table 3.2 provides the consolidated view of the theoretical foundations of the GLOSP dimensions and this also demonstrates their institutional relevance. This theoretical integration is the conceptual justification for adopting a multidimensional framework in analysing the performance dynamics of PACS.

3.14 GLOSP Performance Framework for PACS (GLOSP Model)

The GLOSP model follows a structured flow for data collection and preparation. The primary source of data is the audited financial statements of PACS. The structured flow of data from financial variables to the composite index and finally the composite performance assessment, is diagrammatically presented in chart 3.4

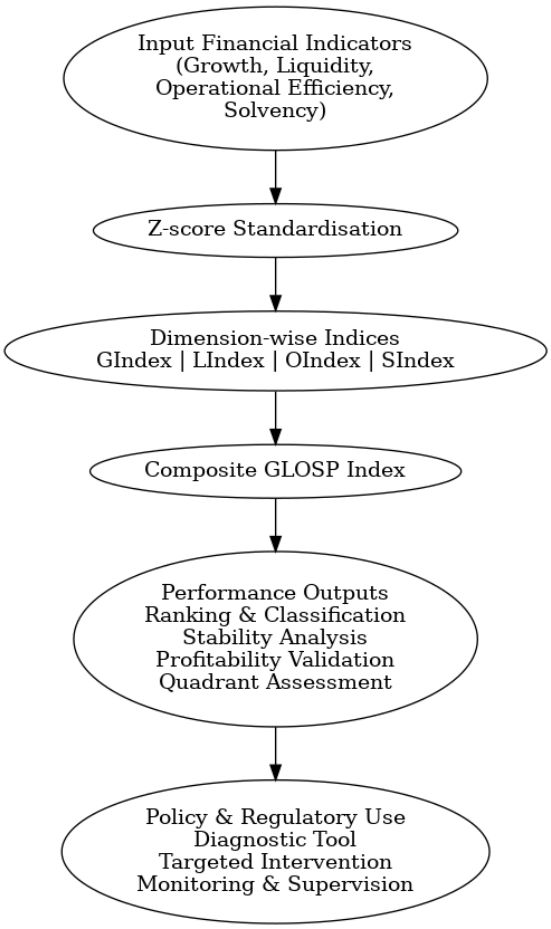


Chart 3.4: Conceptual Framework of the GLOSP Performance Evaluation Model for PACS

This chart 3.4 provides a sequential analytical line linking audited financial data to performance diagnosis. This is the sequential flow of raw financial variables from the statement to a comparable performance score that facilitate both comparative and longitudinal analysis.

3.15 Theoretical Foundations of the Study

This section aims to position the GLOSP framework within established theoretical traditions and to clarify the intellectual assumptions guiding the interpretation of empirical findings. Drawing insights from institutional economics, financial intermediation theory, efficiency theory, risk theory, and systems theory, the analytical framework adopted in this study is based on multidisciplinary theoretical foundation.

Traditional financial performance studies often interpret institutional outcomes mainly through profit-maximisation logic. However, the institutional performance of cooperative financial institutions cannot be adequately explained through single-indicator measures. Therefore, the present study adopts a multidimensional theoretical perspective, where institutional sustainability is viewed as an emergent outcome arising from the interaction of structural, operational, and financial conditions.

3.15.1 Institutional Economics Perspective

Institutional economics states that organisational outcomes are formed not only by market forces but also by governance structures, incentive systems, and institutional rules (Williamson, 1985; North, 1990). Because of this, institutions operating within similar regulatory environments may have different performance outcomes due to variations in internal institutional arrangements. Ostrom (1990) argues that region specific governance practices and collective decision-making processes have strong influences on institutional performance.

The empirical context of PACS can be related to this theoretical proposition. Because, PACS operating under identical regulatory and policy conditions often exhibit persistent performance differences. The profit-making and loss-making

societies coexisting within the same districts indicate that external policy frameworks alone cannot explain institutional outcomes. Instead, internal factors such as liquidity discipline, operational efficiency, capital structure, and managerial practices have higher importance. The study therefore supports the institutional economics view that organisational performance is largely institution-specific rather than uniform policy environment.

3.15.2 Financial Intermediation Theory

Financial intermediation theory explains the role of financial institutions in mobilising savings, allocating credit, managing risks, and reducing transaction costs within an economy (Gurley & Shaw, 1960; Levine, 1997). Diamond (1984) states that financial intermediaries improve efficiency by ensuring proper information flow between borrowers and lenders. However, traditional spirit of intermediation theory mainly focusses around commercial banks which connect people who have excess money and those who are in need of money. This theory gives limited attention to cooperative financial institutions.

The present study extends the focus of financial intermediation theory to the cooperative sector also. The cooperatives efficiently connect borrowers and lenders ensuring growth, liquidity, operational efficiency, and solvency conditions. Empirical findings indicate that PACS improve profitability by maintaining adequate liquidity and operational discipline.

3.15.3 Efficiency and Performance Measurement Theory

Efficiency theory, explains performance differences among organisations in terms of how effectively inputs are converted into outputs (Farrell, 1957). This theory is rooted in production economics and states that, performance efficiency is related to the effective utilisation of inputs and operations. Later developments in efficiency emphasised the importance of cost structures, resource utilisation, and operational management in shaping organisational outcomes (Coelli et al., 2005). In financial institutions, efficiency is commonly evaluated using cost ratios, operating margins, and productivity indicators.

The findings of the present study suggest a more refined interpretation of efficiency in cooperative institutions. Operational efficiency has meaningful association with institutional performance. Because, organisational outcomes emerge from the interaction of multiple financial and operational dimensions rather than from a single explanatory factor. This interpretation is consistent with multidimensional performance measurement theory, as the theory views institutional performance as the result of composite interaction among several performance attributes.

3.15.4 Systems Theory Perspective

General systems theory explains that outcomes in complex organisations arise from interaction among interdependent components rather than from isolated causal factors (von Bertalanffy, 1968). Simon (1962) similarly argues that complex systems exhibit hierarchical interdependence, where overall behaviour cannot be fully understood by analysing individual elements separately. Thus, systems theory provides the principal conceptual foundation for the analytical approach adopted in this study.

The GLOSP framework presented in this study, applies this systems perspective to the analysis of cooperative performance. It conceptualises institutional performance as a composite outcome shaped by growth capacity, liquidity stability, operational efficiency, and solvency strength. The empirical findings of the study show that profitability cannot be explained by any single dimension operating independently. Instead, institutional outcomes emerge from the interaction of multiple financial conditions. This systemic interpretation supports an interaction-based understanding of institutional behaviour and contributes to theoretical advancement by empirically demonstrating the relevance of a systems-based approach in evaluating cooperative financial institutions.

3.15.5 Risk and Stability Framework

Risk theory explains institutional sustainability as the balance between financial exposure and risk stabilisation. Merton (1977) states that efficient financial institutions should be stable under conditions of uncertainty, and this becomes

possible, only if there is adequate capital and liquidity buffers. The empirical findings of the present study reflect these theoretical insights. It has considered liquidity stability and solvency strength as important dimensions of cooperative profitability. The study emphasises that financial performance of PACS depends on structural balance among key financial dimensions rather than relying on isolated performance indicators.

3.15.6 Theoretical Implications of the Study

Existing approaches often evaluate institutional health using isolated indicators such as profit, recovery ratios, or business volume. The empirical findings of the study show that such single-indicator approaches are analytically inadequate. They fail to capture the structural interdependence that shapes institutional outcomes. In this context, the present study reconceptualises cooperative financial performance as a multidimensional institutional phenomenon.

By developing and empirically validating a composite diagnostic framework, the study advances a systemic understanding of cooperative performance. It analyses the interaction among multiple financial dimensions of PACS rather than relying on individual measures. Thus, the study contributes to the refinement of analytical models suitable for evaluating grassroots financial institutions such as PACS.

3.15.7 Concluding Note on Theoretical Foundation

In summary, the theoretical foundation of the study lies on the integration of institutional, financial, efficiency, risk, and systems perspectives of PACS. This integrative orientation recognises that cooperative performance emerges from interaction among multiple structural and operational dimensions. The GLOSP framework represents this theoretical synthesis by translating multidimensional institutional dynamics into an empirically measurable performance model. Through this integration, the study not only applies established theoretical principles but also extends them by demonstrating the analytical value of systems-based evaluation in cooperative finance research.

3.16 Theoretical Model Specification

The analytical logic of the study is expressed as a structural performance function as follows:

(Note: *This is the theoretical system equation, not an operational model equation. Here* I_i *represents institutional and contextual characteristics influencing performance outcomes. This is not included in the direct components of the GLOSP index)*

$$P_i = f(G_i, L_i, O_i, S_i \mid I_i)$$

where institutional profitability P_i is the systemic outcome determined by growth capacity G_i, liquidity stability L_i, operational efficiency O_i, solvency strength S_i, and institution-specific characteristics I_i. This formulation clearly reveals the complementary nature of dimensions. It also implies that weakness in one component may offset strength in another. Consequently, the institutional sustainability is the result of balanced performance among various dimensions rather than any single dimension.

3.17 Integrated Conceptual Structure of the GLOSP Framework

The GLOSP model views performance as the outcome of interacting financial dimensions. Growth, liquidity, operational efficiency, and solvency are the interacting financial dimensions or interdependent components that jointly influence the stability and profitability of PACS. The interdependence of components is explained as:

- *growth without liquidity discipline increases risk exposure, and efficiency gains unsupported by adequate capital strength weakens resilience. Similarly, solvency without operational efficiency limits service sustainability. Thus, GLOSP framework reaffirms that profitability is a resultant of balanced dimensional performance.*

Each dimension of the GLOSP framework is theoretically grounded. Performance of PACS does not emerge from isolated functioning of these dimensions. It is the result from the interaction and mutual reinforcement of dimensions such as growth, liquidity, operational efficiency, and solvency. The integrated theoretical

structure of the GLOSP dimensions presented in chart 3.5, illustrate this theoretical interdependence.

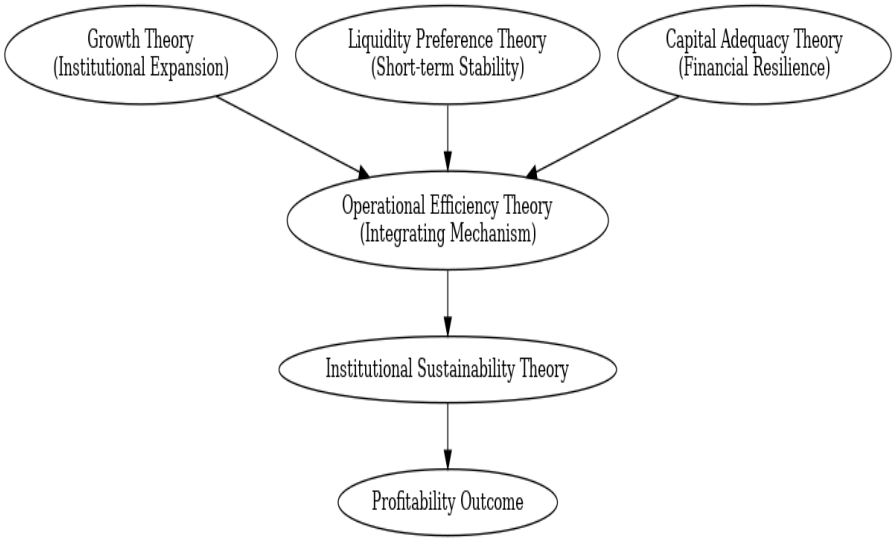


Chart 3.5 Integrated Theoretical Structure of GLOSP Dimensions

Chart 3.5 summarises the integrated theoretical structure of the GLOSP framework. This chart illustrates the interdependence of financial dimensions and their cumulative influence on profitability.

3.18 Theoretical Propositions

The theoretical propositions directing the analytical framework are given below:

Proposition 1—Multidimensional Determination

Institutional profitability is the result of joint interaction of financial dimensions. It is not completely reflected in any single indicator.

Proposition 2—Structural Precedence

Operational and financial structure of the organisation has influence in the profitability.

Proposition 3—Conditional Efficiency Effect

Operational efficiency influences comparative performance of organisation, but does not independently determine dynamic profitability.

Proposition 4—Liquidity as Stability Variable

Liquidity influences probability of profitability of organisation, rather than the magnitude of profitability. Liquidity functions primarily as a risk-moderating variable.

Proposition 5—Institutional Heterogeneity Principle

Performance variations among PACS operating under similar environments, is because of internal institutional differences rather than external policy conditions.

Thus, the theoretical foundations of the GLOSP model establish its conceptual legitimacy. However, operational clarity is essential for empirical application. Accordingly, the proposed framework is structured into distinct dimensions, components, and measurable indicators that collectively facilitate systematic performance evaluation of PACS. The components and analytical structure of the GLOSP model are presented in Table 3.3.

Table 3.3 Components and Structure of the GLOSP Model

GLOSP Dimension	Key Components	Representative Indicators	Analytical Role in the Model
Growth	Business expansion and outreach	Membership growth, deposit growth, loan growth	Captures expansionary capacity and scale dynamics
Liquidity	Short-term financial stability	Cash ratio, deposit–loan coverage ratio, working capital ratio	Measures ability to meet short-term obligations

Operational Efficiency	Cost management and income generation	Operating cost ratio, establishment expenses ratio, income–expense ratio	Determines effectiveness of resource utilisation
Solvency	Capital strength and resilience	Capital adequacy proxy, reserve fund ratio, debt–equity ratio	Assesses long-term financial sustainability
Profitability	Surplus generation and return	Net profit margin, return on working capital	Represents cumulative financial outcome

Table 3.3 presents the operational structure of the GLOSP model by linking each performance dimension with its corresponding components and measurable indicators. Growth indicators reflect the expansionary behaviour of PACS, while liquidity indicators capture short-term stability. Operational efficiency indicators evaluate the ability of societies to manage costs and generate income. Solvency indicators ensure long-term financial resilience. Profitability indicators reflect the combined influence of all dimensions. It is the outcome measure. This structured classification is the basis for the systematic computation, comparability, and empirical testing of performance dynamics, which are done in subsequent analytical chapters.

3.19 Context-Sensitive and Diagnostic Orientation

The GLOSP framework is basically a context-sensitive and diagnostic performance evaluation tool. It considers the structural heterogeneity of PACS - with respect to size, operational environment, and membership composition (NABARD, 2022). It also makes meaningful comparison using standardised indicators and relative performance assessment. However, it does not impose any uniform thresholds (OECD, 2008). It identifies dimension-specific weaknesses caused to the financial outcomes, and thus facilitates targeted corrective measures (RBI, 2021). These features enhance the analytical and practical relevance of the model.

3.20 Comparative Positioning and Institutional Relevance of the GLOSP Framework

This section makes an attempt to compare the conventional performance evaluation frameworks applied to financial institutions, such as statutory audit classification, CAMEL-type rating systems, and Financial Soundness Indicators (FSI) with GLOSP performance evaluation model. Table 3.4 presents the comparative insights of GLOSP model with other financial performance evaluation frameworks.

Table 3.4 GLOSP Comparison with CAMEL and FSI

Feature	GLOSP Model (This Study)	CAMEL Model (Banking Supervision)	FSI (IMF Financial Soundness Indicators)
Primary Purpose	To measure multidimensional performance of PACS in Kerala	To assess soundness and supervisory quality of banks	To monitor macro-financial stability of financial systems
Type of Model	Multi-dimensional performance and composite index	Multi-dimensional supervisory evaluation	Indicator-based financial stability assessment
Main Dimensions	Growth, Liquidity, Operational Efficiency, Solvency, Profitability	Capital Adequacy, Asset Quality, Management, Earnings, Liquidity	Capital Adequacy, Asset Quality, Earnings, Liquidity, Sensitivity
No. of Dimensions	5	5	5+
No. of Indicators	~18 indicators across 5 dimensions	12–20 (depends on regulator)	15+ core indicators
Data Source	CAMIS audited financial statements of PACS	Bank financial statements and supervisory data	National financial system reports
Indicator Nature	Financial ratios + growth metrics	Financial ratios + supervisory assessments	Financial ratios + stress indicators
Standardization Method	Z-scores for all indicators	Ratios, risk weights, supervisory assessment	Ratio-based evaluation; some normalised

Index Construction	Averages of Z-scores → 5 indices → Composite GLOSP score	No composite index; qualitative + quantitative mix	No single index; interpreted individually
Interpretation	Higher score = better PACS performance	Lower risk and higher stability = better	Better indicators = higher resilience
Usefulness for PACS	Strong, as it captures profitability, efficiency, solvency, and growth	Moderate (bank-focused, not cooperative-focused)	Limited relevance; system-wide focus
Strength of Approach	Tailored to cooperative sector; multidimensional; data-driven	Globally validated supervisory tool	Highly robust and internationally adopted
Limitations	Requires good data consistency and standardisation	Subjective elements in "Management" assessment	Complex and often macro-level, not PACS-level

3.20.1 Comparison of GLOSP Model with Statutory Audit Classification

The audit wing of the Department of Cooperation classifies PACS into A, B, C, and D categories based on the marks awarded to each on the basis of audited results. This classification is done as per the guidelines issued by the Registrar of Cooperative Societies.

The classification is based on a 100-mark system, covering two broad dimensions –

i) Financial Stability and Economic Viability, and
ii) Administrative Efficiency and General Performance.

Marks are awarded to each society under several heads such as capital structure, loan operations, overdue position, reserve adequacy, management practices, and general working. Based on the total marks obtained by the societies, PACS are placed into one of the four audit classes. This audit classification plays a crucial regulatory role in administrative supervision, corrective control, and statutory

compliance. Even staff pattern of PACS are determined on the basis of this audit classification.

On the other side, GLOSP performance evaluation model evaluates PACS as cooperative institutions focused on sustainability and functioning with service motto. The GLOSP framework upholds the foundational principles of cooperation by evaluating PACS as member-driven institutions committed to service continuity, financial discipline, and community stability. By emphasising liquidity adequacy, solvency resilience, and operational sustainability, the model aligns with cooperative values such as democratic control, member participation, and institutional autonomy.

The statutory audit classification focuses primarily on annual compliance and accounting accuracy, but GLOSP provides a multidimensional and dynamic evaluation of institutional health. Table 3.5 compares the GLOSP model with statutory audit classification approach.

Table 3.5 Statutory Audit Classification vs. GLOSP Model

Aspect	Statutory Audit Classification (A–D)	GLOSP Model
Primary Purpose	Regulatory supervision and compliance	Analytical evaluation of profitability dynamics
Nature of Assessment	Largely qualitative + discretionary marks	Fully quantitative and formula-based
Underlying Logic	Score-based inspection	Index-based financial diagnostics
Time Dimension	Mostly single-year assessment. Previous liabilities and pending loan overdues are counted	Explicit multi-year (panel) analysis
Standardisation	None	Z-score standardisation
Weight Assignment	Fixed, administratively determined	Implicit, data-driven through standardisation
Replicability	Depends on auditor discretion	Fully replicable and transparent
Sensitivity to Change	Low (broad classes)	High (continuous indices)
Output	Ordinal class (A/B/C/D)	Continuous composite score + dimensional indices

3.20.2 Methodological Limitations of the Audit Classification System

Statutory audit classification system is institutionally important, because it is the official mechanism to evaluate the performance of PACS, and all regulatory compliances are based on it. However, it exhibits certain methodological limitations when used for academic or analytical purposes:

Subjectivity and Discretion

Several components related to the working of PACS—such as management efficiency, general working, rectification of defects, and even mark allocation within prescribed ranges—depend significantly on auditor judgment. This is caused to subjectivity and inter-auditor variability, limiting comparability across societies and over time.

Static and Single-Year Orientation

Audit classification is essentially year-specific. As a result, it cannot adequately consider:

- progressive improvements in performance
- gradual deterioration in efficiency
- volatility in operative results, and
- sustainability of profitability

Discrete and Coarse Outcomes

The classification fails to consider diverse performance realities. On one side, societies with marginally different scores may fall into the same class, and on other side, while societies with small score differences may be placed in different classes, masking nuanced financial realities.

Mixing of Financial and Non-Financial Criteria

The audit classification combines:

- financial indicators (overdues, reserves, capital), and

- non-financial/administrative factors (meetings, maintenance of accounts, general working).

While suitable for regulation, this dilutes analytical focus when the objective is to understand the performance dynamics specifically.

3.20.3 Comparative Advantages of the GLOSP Model

The GLOSP Model developed in this study addresses the above limitations and offers several methodological and analytical advantages.

Explicit Focus on Profitability Dynamics

Audit classification evaluates the general performance of PACS. On the other side, the GLOSP Model analyses the performance dynamics of PACS. Unlike audit evaluation, GLOSP, consider profitability as a continuous, multidimensional outcome shaped by growth, liquidity, operational efficiency, and solvency. Audit evaluation considers profit or loss as the final outcome of performance.

Multidimensional yet Structured Framework

Audit system considers multiple aspects of societies as implicit and general. But the GLOSP Model formally classifies performance into five analytically distinct dimensions:

- Growth
- Liquidity
- Operational Efficiency
- Solvency, and
- Profitability

This allows GLOSP to identify dimension, which drives performance differences. Audit classification cannot systematically reveal this.

Standardisation and Comparability

By employing *Z-score standardisation*, the GLOSP Model:

- removes scale effects,
- allows comparison across PACS of different sizes,

- ensures inter-temporal comparability, and
- avoids arbitrary mark allocation.

This makes the model statistically robust and academically defensible.

Continuous Measurement and Sensitivity

The GLOSP Composite Score is a continuous metric, enabling:

- fine-grained ranking,
- detection of marginal improvements or deterioration,
- identification of near-threshold societies (e.g., vulnerable but not distressed).

This sensitivity is absent in the discrete A–D audit classes.

Replicability and Transparency

All computations in the GLOSP Model are formula-based and data-driven, using audited CAMIS data. The model can be:

- replicated across years,
- extended to other districts or states,
- automated through spreadsheets or statistical software.

This strengthens its utility as a research and policy tool.

Complementarity Rather than Replacement

The GLOSP Model does not seek to replace the statutory audit classification. Instead, it should be viewed as a complementary analytical framework.

Audit Classification answers:

Is the society administratively and financially acceptable for regulatory purposes?

GLOSP Model answers:

Why is a society profitable or loss-making, and how sustainable is that performance over time?

Thus, while audit classification serves regulatory governance, the GLOSP Model serves diagnostic analysis, academic inquiry, and evidence-based policy formulation.

3.21 Alignment of the GLOSP Model with Cooperative Principles

The conceptual orientation of the GLOSP framework is closely aligned with the Cooperative Principles. GLOSP framework evaluates profitability as a sustainability indicator rather than as an end objective. Here, the GLOSP view supports continuity of services. This perspective is consistent with the cooperative principles which focus on member welfare, stability, and long-term institutional viability.

Liquidity is an important aspect of GLOSP model. This safeguards the ability of PACS to meet member withdrawal demands and seasonal credit requirements. Similarly, operational efficiency ensures responsible utilisation of member resources and promotes accountability in management practices. Solvency supports capital protection against financial shocks. Growth indicators capture expansion capacity without encouraging unsustainable scale enlargement.

These arguments show that, the GLOSP model is consistent with cooperative principles of financial prudence, stability, and member-oriented service delivery. This assessment model reinforces institutional responsibility rather than short-term surplus generation.

3.22 Applicability and Analytical Scope of the GLOSP Model

The GLOSP framework is designed as a structured tool for institutional diagnosis, comparative benchmarking, and performance monitoring. At the PACS level, it helps to identify dimension-specific weaknesses, and at the system level, it facilitates comparison across PACS.

The GLOSP framework is highly suitable for longitudinal analysis of PACS as it can evaluate the performance stability over time. Its standardised and transparent construction is capable of replication and adaptation across regions, and this increases the utility of GLOSP for academic research, supervisory analysis, and policy evaluation. Thus, along with conceptual clarity and empirical adaptability, the GLOSP model provides a structured analytical foundation for understanding the performance dynamics of PACS.

3.23 Chapter Summary

This chapter established the theoretical foundation of the study and provided the conceptual framework of the GLOSP model. Discussing the limitations of existing evaluation approaches, the chapter pointed out the comparative importance of GLOSP over these approaches. The chapter also justified the need for a multidimensional performance framework to evaluate the multidimensional performance dynamics of PACS. The chapter presented the GLOSP framework as a theoretically grounded and institution-sensitive framework for analysing multidimensional performance dynamics among PACS. The operationalisation and empirical testing of the model are discussed in the following chapters.

Chapter 4

RESEARCH METHODOLOGY

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CHAPTER IV

RESEARCH METHODOLOGY

4.1 Introduction

This chapter details the methodological framework adopted for the present study on this research titled, *'Performance Dynamics of PACS in Kerala – A Multidimensional Approach.'* It explains the research design, data sources, sampling framework, operational definitions of variables, indicator construction procedures, and analytical techniques employed. The methodology is structured in this chapter, with a view to enable systematic assessment of financial performance of PACS. It also aims to facilitate systematic derivation and empirical validation of the GLOSP performance evaluation model.

4.2 Nature of the Study

Quantitative and empirical nature of analyses are followed in this study. Using financial variables from audited financial statements, the study, examines the financial behaviour of PACS. The analysis focuses on measurement, comparison, and interpretation of multidimensional performance outcomes of PACS. These include the objective evaluation of growth behaviour, liquidity conditions, operational efficiency, solvency position, and profitability performance of PACS over time. However, no attempts have been made to examine the perception-based or behavioural analysis of performance.

4.3 Research Design and Sampling Framework

4.3.1 Research Design

The study basically follows an analytical research design. However, it integrates descriptive, diagnostic, and longitudinal components to examine performance dynamics of PACS in Kerala. The descriptive dimension is used for the systematic examination of institutional structure and financial configuration. The diagnostic methods are used for the assessment of multidimensional performance differences and their association with profitability outcomes.

4.3.2 Period of Study

The period of the study is five years from 2020–21 to 2024–25.

4.3.3 Data and Sources

Secondary data collected from the CAMIS database is mainly used for the analysis. CAMIS provides reliable and standardised data from the audited financial statements of PACS functioning in Kerala under the control of Registrar of Cooperative Societies.

In addition to the raw secondary data from CAMIS, the study also uses analytically derived data generated through systematic statistical transformation procedures. These data are derived from the secondary dataset through ratio computation, normalization, and standardization techniques. In this way, this is the tertiary data set used for the study, to facilitate comparative and multidimensional analysis. This data set includes processed indicators such as standardized values, dimension-specific indices, and composite performance measures developed for analytical purposes.

Accordingly, the study comprises multiple analytical levels. At first, the original financial statement data is taken from CAMIS, then the financial indicators are derived, and finally standardized index values are constructed. These data levels enable robust measurement, dimensional assessment, and empirical validation of institutional performance.

4.3.4 Population and Sampling Frame

All the 1646 PACS functioning in Kerala, during the period of the study constitute the population of the study.

Sampling frame constitutes all PACS with audited financial records are available in the CAMIS database for the study period. As these audited data are uploaded in the database on different times, the data uploaded until 31 December 2025 were included in the sampling frame.

4.3.5 Selection Criteria

All extreme performing PACS from profit and loss category were considered for the study. The nature of extreme performance is given below:

Profit-making PACS (High-performing)

Consistently reported net profits for all five financial years (FY 2020–21 to 2024–25), which have demonstrated progressive improvement in profitability (profit amount increasing year after year).

Loss-making PACS (Low-performing)

Consistently reported net losses for all five financial years, which have shown worsening financial results over time (increasing losses year after year).

The classification of PACS into profit-making and loss-making categories is used solely for comparative and validation purposes, while performance is independently measured using the multidimensional GLOSP framework derived from empirical indicator analysis.

4.3.6 Multi-Stage Sampling Procedure

The sampling process proceeded through sequential filtration stages designed to ensure stability of classification and completeness of financial data. In the first stage, all PACS with audited financial records available in the CAMIS database for the study period were considered.

In the second stage, institutions were classified based on annual net profit or net loss status. Within the audited population, 474 PACS were identified as profit-making and 690 as loss-making, subject to year-wise variation.

In the third stage, a longitudinal consistency criterion was applied to find PACS with continuous profitability and losses in all five years. In this stage, PACS were retained only if they demonstrated same directional behaviour – profit or loss-over all five years from 2020–21 to 2024–25. Form this list, continuous progressive performing PACS were identified.

Fourteen PACS with progressive profitability and thirty PACS with progressively worsening losses, throughout the period, were found eligible to be included in the sample.

In the final stage, a data completeness screening was undertaken to make the final selection. This is done to ensure availability of all financial indicators required for GLOSP index construction and econometric analysis.

4.3.7 Sample Size

After the data completeness screening, thirteen persistently profit-making and twenty-three persistently loss-making PACS were found eligible to be selected as final sample. All PACS meeting the specified criteria were included in the final list, and the list includes a total of 36 PACS. *(A detailed list of the selected institutions is provided in Annexure II).*

The following chart illustrates the sequential filtration process undertaken in the sample selection, and it shows the number of PACS retained at each stage of selection.

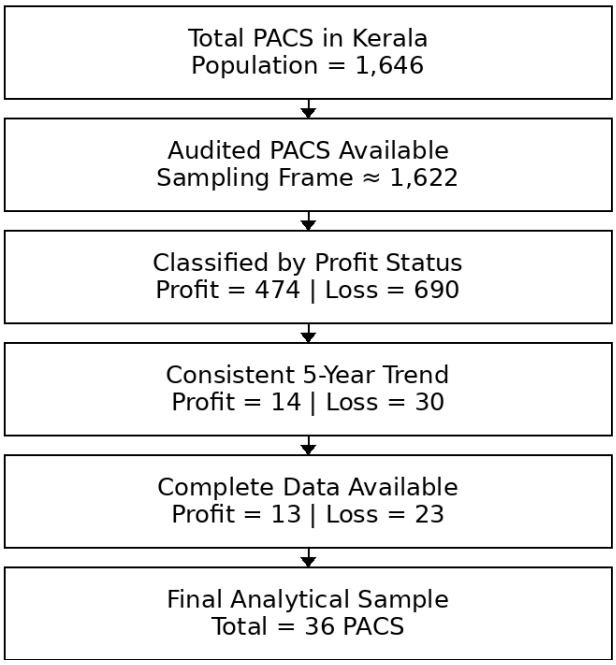

Chart 4.1 Sample Selection Process

4.3.8 Rationale for Extreme-Group Design

The sampling structure used for the study represents a purposive, criteria-based extreme-group design. This extreme group approach is done to improve internal analytical validity and to facilitate clearer comparison of multidimensional financial

conditions. As the sample in this study is intended to make diagnostic examination of performance dynamics rather than statistical generalisation, the extreme strategy is considered suitable.

4.4 Conceptual and Operational Definitions Used in the Study

The below given table 4.1 gives the conceptual and operational definitions used in the study.

Table 4.1 Operational Definitions of GLOSP Dimensions and Indicators

Dimension / Component	Conceptual Definition	Operational Definition	Interpretation Logic
Growth (G)	Growth refers to the capacity of a PACS to expand its business operations over time in a sustainable manner.	Measured using indicators capturing expansion in deposits, loans, and overall business volume over the study period.	Higher growth values indicate increasing operational scale. However, growth is interpreted cautiously and assessed alongside liquidity, efficiency, and solvency to avoid expansion-induced financial stress.
Liquidity (L)	Liquidity represents the ability of a PACS to meet short-term financial obligations without disruption to normal operations.	Operationalised through liquidity ratios such as cash ratio and deposit–loan coverage measures reflecting availability of liquid	Higher liquidity values indicate stronger short-term financial resilience and greater capacity to absorb operational shocks.

Dimension / Component	Conceptual Definition	Operational Definition	Interpretation Logic
		resources relative to immediate liabilities.	
Operational Efficiency (O)	Operational Efficiency refers to the effectiveness with which a PACS utilises its resources to generate income while controlling operating costs.	Measured using cost-related indicators including operating cost ratios and expense–income relationships. Indicators are directionally adjusted so that higher values represent greater efficiency.	Higher efficiency values imply lower cost burden per unit of income generated and improved resource utilisation.
Solvency (S)	Solvency denotes the long-term financial stability of a PACS and its ability to meet long-term obligations without erosion of capital.	Captured using leverage and asset-structure indicators such as debt–equity ratio and fixed asset ratio. Directional adjustment ensures higher scores represent stronger solvency.	Higher solvency scores reflect stronger capital adequacy and lower long-term financial risk exposure.
Profitability (P)	Profitability indicates the	Measured using	In this study, profitability is

Dimension / Component	Conceptual Definition	Operational Definition	Interpretation Logic
	ability of a PACS to generate surplus from its operations during an accounting period.	accounting indicators such as Net Profit Margin and Return on Working Capital.	treated as an outcome variable rather than a structural component of performance. It evaluates how variations in G, L, O, and S translate into financial surplus.
Composite GLOSP Index	Represents the overall multidimensional financial performance of a PACS.	Constructed by aggregating standardised and directionally adjusted scores of Growths, Liquidity, Operational Efficiency, and Solvency using equal weights.	Provides a single diagnostic measure of financial–institutional performance while preserving multidimensional structure.
Performance Dynamics	Refers to the interaction and evolution of multidimensional financial performance components over time and their influence on profitability outcomes.	Examined by analysing how changes in Growth, Liquidity, Operational Efficiency, and Solvency interact across time periods to produce differential profitability outcomes.	Highlights systemic interaction among dimensions and explains institutional heterogeneity under similar regulatory conditions.

4.5 Variables Used in the Study

The financial variables extracted from audited financial statements are the direct independent variables used for the study. The complete list and operational definitions of direct variables are provided in Table 4.2.

Table 4.2 Direct Independent Variables Used for the Study (CAMIS Data)

Sl. No.	Variable Name	Operational Definition	Unit of Measurement	Symbol
1	Number of Members	Total individual members enrolled in the PACS at year-end	Number	MEM
2	Paid-up Share Capital	Equity capital contributed by members	₹ Lakhs	SC
3	Reserve Funds	Accumulated reserves created out of profits	₹ Lakhs	RF
4	Total Deposits	Aggregate deposits mobilized (savings, fixed, recurring, etc.)	₹ Lakhs	DEP
5	Total Borrowings	Funds borrowed from apex banks and other institutions	₹ Lakhs	BORR
6	Interest Burden	Interest paid and payable on borrowings	₹ Lakhs	IB
7	Outstanding Loans	Total loans outstanding at year-end (agricultural & non-agricultural)	₹ Lakhs	OSL
8	Miscellaneous Income	Non-interest operational income (rent, commission, dividend, etc.)	₹ Lakhs	MI
9	Establishment Expenses	Staff salaries and personnel-related expenses	₹ Lakhs	EE
10	Contingency Expenses	Administrative and operational expenses	₹ Lakhs	CE

Sl. No.	Variable Name	Operational Definition	Unit of Measurement	Symbol
11	Movable & Immovable Assets	Long-term physical assets owned by PACS	₹ Lakhs	MAI
12	Cash at Bank	Liquid funds available in bank accounts	₹ Lakhs	CAB
13	Valuation of Investments	Market value of investments held by PACS	₹ Lakhs	INV
14	Gross Profit / Loss	Trading surplus/deficit from business activities	₹ Lakhs	GP
15	Net Profit / Loss	Final surplus/deficit after all expenses	₹ Lakhs	NP
16	Working Capital	Sum of share capital, deposits, and borrowings	₹ Lakhs	WC
17	Previous Year Deposits	DEP(t–1)	Needed for growth calculations	
18	Previous Year Borrowings	BORR(t–1)	Needed for growth calculations	
19	Previous Year Outstanding Loans	OSL(t–1)	Needed for growth calculations	
20	Previous Year Net Profit	NP(t–1)	Needed for growth calculations	
21	Previous Year Members	MEM(t–1)	Needed for growth calculations	
22	Total Income	TI	Estimated Interest Income + Miscellaneous Income + Gross Profit/Loss (Estimated Interest Income $= 0.12 \times$ *Outstanding Loans)*	

4.6 Derived Financial Ratios and Indicators

From the direct variables received from audited statements, a set of financial indicators was derived to frame specific dimensions of PACS performance. These derived indicators were grouped under each GLOSP dimension, classified as growth, liquidity, operational efficiency, solvency, and profitability.

Table 4.3 Growth Indicators

Indicator	Formula	Definition and Purpose
Membership Growth (MG)	$(Members_t - Members_{t-1}) \div Members_{t-1}$	Membership expansion-Indicates institutional expansion
Deposit Growth (DG)	$(Deposits_t - Deposits_{t-1}) \div Deposits_{t-1}$	Mobilisation growth. Measures deposit mobilisation
Loan Growth (LG)	$(Loans_t - Loans_{t-1}) \div Loans_{t-1}$	Loan expansion. Reflects credit growth
Borrowing Growth (BG)	$(Borrowings_t - Borrowings_{t-1}) \div Borrowings_{t-1}$	Borrowing from apex banks, govt. and others. Indicates reliance on external funds
Profit Growth (PG)	$(Profit_t - Profit_{t-1}) \div Profit_{t-1}$	Improvement in surplus. Measures sustainability of profitability.

Table 4.4 Liquidity Indicators

Indicator	Formula	Definition and Purpose
Cash Ratio (CR)	Cash at Bank ÷ Total Deposits	Measures short-term liquidity adequacy.
Working Capital Ratio (WCR)	Working Capital ÷ Total Assets (Proxy)	Overall liquidity strength. Indicates liquidity adequacy
Deposit-Loan Coverage (DLC)	Cash at Bank ÷ Total Borrowings	The extent to which short-term debt obligations are covered by liquid assets. Measures borrowing repayment capacity

Table 4.5 Operational Efficiency Indicators

Indicator	Formula	Definition and Purpose
Loans to Working Capital (LWC)	Outstanding Loans ÷ Working Capital	Loan deployment efficiency. Measures credit deployment efficiency
Diversification Ratio (DR)	Misc. Income ÷ Total Income	Income diversity stability. Indicates income diversification
Operating Efficiency (OE)	Gross Profit ÷ Establishment Expenses	Efficiency of business operations. Measures productivity of staff costs
Operating Cost Ratio (OCR)	Operating Expenses ÷ Total Income	Cost efficiency. Measures cost burden (negative indicator)

Table 4.6 Solvency Indicators

Indicator	Formula	Definition and Purpose
Debt-Equity Ratio (DE)	Borrowings ÷ Share Capital	Leverage level. Measures financial leverage (negative)
Capital Adequacy Proxy (CAP)	Share Capital ÷ Working Capital	Internal capital strength. Indicates own-fund strength
Fixed Asset Ratio (FAR)	Fixed Assets ÷ Total Assets (Proxy)	Assesses asset structure stability.

Table 4.7 Profitability Indicators

Indicator	Formula	Definition and Purpose
Net Profit Margin (NPM)	Net Profit ÷ Total Income	Profitability efficiency. Measures efficiency in generating surplus
Return on Working Capital (ROWC)	Net Profit ÷ Working Capital	Return generated per unit of working capital. Assesses return on funds employed

Indicator	Formula	Definition and Purpose
Gross Profit Ratio (GPR)	Gross Profit ÷ Total Income	Trading performance. Indicates operational trading efficiency
Operating Cost Ratio (OCR)	Operating Expenses ÷ Total Income	Cost efficiency. Measures cost burden (negative indicator)

4.7 Construction of Dimension-wise GLOSP Indices

Separate index values were calculated for each GLOSP dimension. Each index is the average of relevant Z-scores within the respective dimension.

The operational structure of each index is presented in Table 4.8.

Table 4.8 Index Construction (G, L, O, S, P)

Growth Index (GIndex)	$GIndex = Avg(Z_{MG}, Z_{DG}, Z_{LG}, Z_{BG}, Z_{PG})$
Liquidity Index (LIndex)	$LIndex = Avg(Z_{CR}, Z_{WCR}, Z_{DLC})$
Operational Index (OIndex)	$OIndex = Avg(-, Z_{OCR}, Z_{DR}, Z_{OE}Z_{LWC})$
Solvency Index (SIndex)	$SIndex = Avg(-, Z_{DE}, Z_{CAP}Z_{FAR})$
Profitability Index (PIndex)	$PIndex = Avg(Z_{NPM}, Z_{ROWC}, Z_{GPR}, -Z_{OCR})$

4.8 Construction of Composite GLOSP Index

The four structural indices —Growth, Liquidity, Operational Efficiency, and Solvency- were aggregated to calculate the Composite GLOSP Index. The profitability index was excluded from this aggregation, and it was used separately for validation and classification purposes. While aggregating the composite score, equal weighting was adopted to maintain transparency and to avoid subjective bias. This is done because of the absence of established theoretical guidance for differential weighting across dimensions.

The GLOSP index uses equal weights for Growth, Liquidity, Operational Efficiency, and Solvency because these are treated as equally important dimensions of PACS performance. Although PCA could provide statistically determined weights,

such weights would depend on the variance and relationships within the particular sample and period. Therefore, equal weighting was preferred because it is simple, transparent, comparable across PACS and years, and easier to interpret. PCA is used in the study to examine and validate the multidimensional structure, not to decide the relative importance of the dimensions.

Table 4.9 Composite GLOSP Score

Final Model Output:	$GLOSP = Avg\,(GIndex, LIndex, OIndex, SIndex)$

4.9 Z-Score Standardisation of Indicators

Standardisation transforms raw indicator values into unit-free scores based on deviations from the sample mean. Therefore, Z-score standardisation was done on indicators with a view to enable aggregation across them. Generally, indicators with higher value represents better performance. However, certain indicators, such as operating cost ratio and debt–equity ratio behave in the opposite direction. Therefore, directional sign correction was applied on them prior to standardisation.

In the case of OCR – it is treated directionally in both operational efficiency and profitability indices to maintain interpretative consistency.

The standardisation procedure and sign adjustments are detailed in Table 4.10 and Table 4.11.

Table 4.10 Operational Definitions – GLOSP Indices

Index	Components	Interpretation
GIndex	Z-scores of MG, DG, LG, BG, PG	Growth performance
LIndex	Z-scores of CR, WCR, DLC	Liquidity strength
OIndex	Z-scores of OE, DR, LWC, −OCR	Operational efficiency
SIndex	Z-scores of CAP, FAR, −DE	Solvency position
PIndex	Z-scores of NPM, ROWC, GPR, −OCR	Profitability strength

Formula used for Standardization:

$$Z_i = \frac{X_i - \bar{X}}{\sigma}$$

where:

X_i = indicator value for a PACS

$\bar{X}$ = indicator mean across all PACS

σ= standard deviation

Table 4.11 Z-score Treatment (sign correction)

Indicator	Z-score sign	Reason
OCR	Negative	Higher cost is bad → multiply by –1
DE	Negative	High leverage reduces solvency → negative loading
Some profitability metrics	OCR negated in PIndex	Already applied

4.10 Operational Flow of Data Processing and Index Construction

Multiple staged data processing and evaluation has been used for the study. The operational flow of data processing and index construction adopted in the study is illustrated in Chart 4.2.

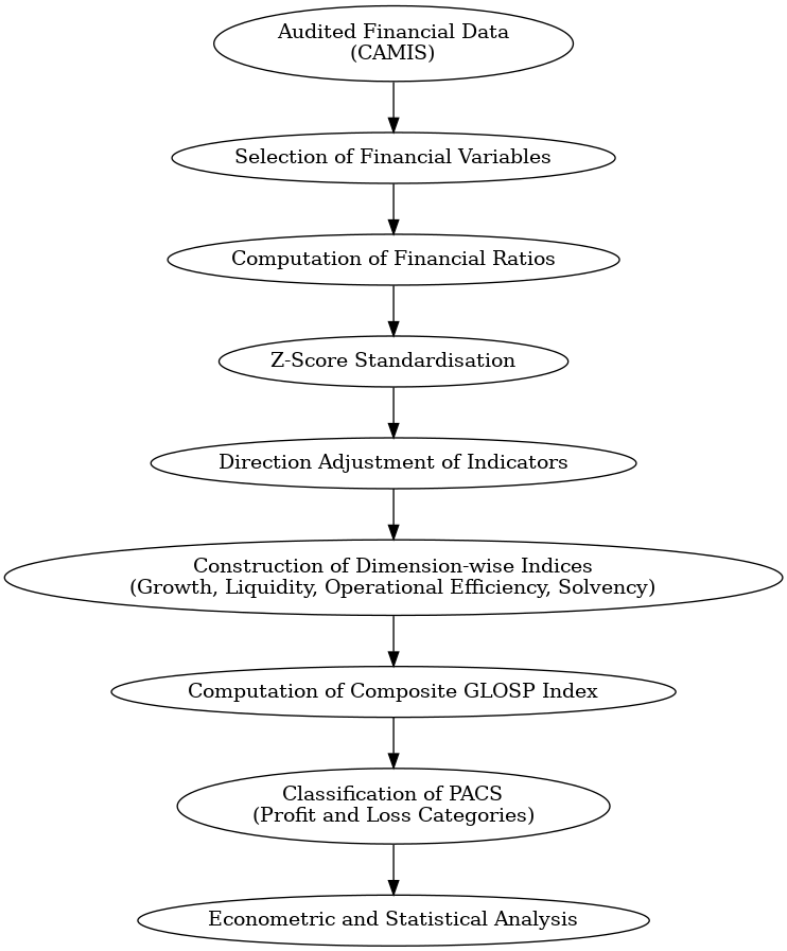

Chart 4.2 Operational Flow of Data Processing and Index Construction

Chart 4.2 presents the sequential methodological process followed in the study. This is to improve methodological clarity. The audited financial data obtained from the CAMIS database was firstly used to identify relevant financial variables, and these were converted into meaningful financial indicators in the form of ratios. These indicators were standardised using the Z-score technique, with a view to ensure comparability across PACS of varying size. Directional adjustments were applied to certain indicators, to maintain uniform interpretation. Using these indicators, dimension-wise indices relating to growth, liquidity, operational efficiency, and solvency were constructed. Further, these were integrated to compute the composite GLOSP index.

Thus, the analytical framework – The GLOSP model—presented in the study is emerged from empirical data processing.

4.11 Formula-Driven GLOSP Framework

Chart 4.3 presents the Formula-Driven GLOSP Framework.

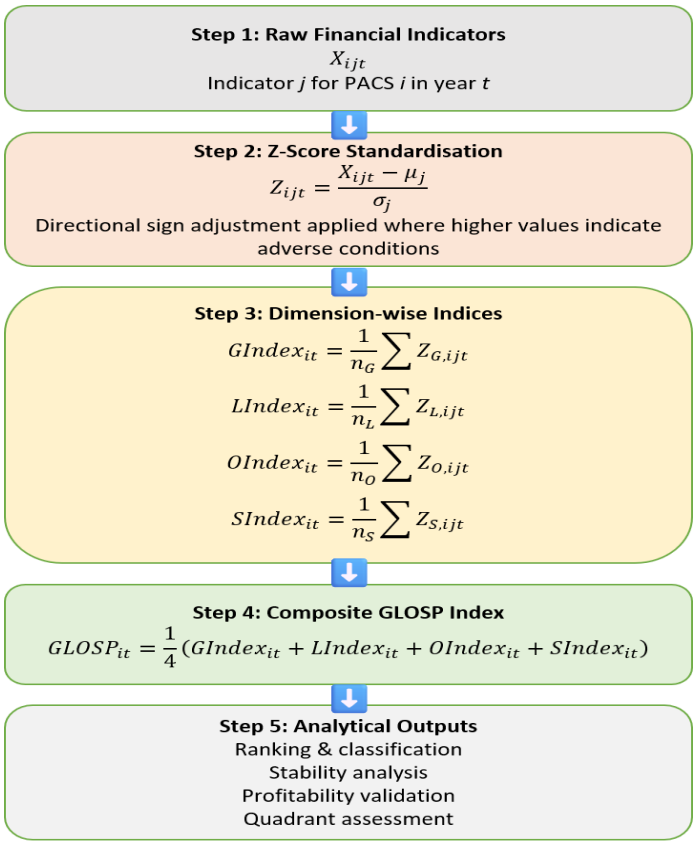

Chart 4.3 Formula-Driven GLOSP Framework

The chart explains the sequential process of the framework, beginning from audited financial variables, and followed by ratio computation, Z-score standardisation, construction of dimension-wise indices, and finally aggregates into a composite performance score. The framework can further produce analytical outputs such as ranking, stability analysis, quadrant classification, and policy diagnosis.

4.12 Data Analysis Plan

To examine the performance dynamics of PACS in Kerala, the study adopts a structured and sequential data analysis plan. To ensure comparability across societies and across time, Z-score standardisation is applied. This standardisation enables meaningful aggregation of heterogeneous financial indicators.

Dimension-wise indices for growth, liquidity, operational efficiency, and solvency are constructed by aggregating the standardised indicators. These dimension-specific indices are then combined to compute the Composite GLOSP Index. The composite index is used for institutional ranking, classification, and comparative performance assessment.

Descriptive statistical analysis is employed to examine central tendencies and dispersion patterns of financial indicators. Mean difference tests and appropriate non-parametric tests are conducted to assess variations between profit-making and loss-making PACS. Correlation analysis is used to examine interrelationships among the major financial variables.

In addition to these, econometric techniques are applied to analyse performance dynamics of PACS more rigorously. The tools include pooled Ordinary Least Squares (OLS) regression, panel fixed effects and random effects models, and binary choice models such as logit and probit. Model diagnostics and specification tests were conducted to ensure robustness and reliability of the results. Robustness is further examined by comparing findings across alternative econometric specifications. The results are interpreted within the analytical framework developed for the study.

The analysis is carried out using Microsoft Excel and econometric software packages such as Gretl and panel data tools. Excel is primarily used for data cleaning, computation of derived ratios, construction of standardised indicators, and preparation of summary tables and graphical outputs

4.12.1 Justification of Econometric Strategy

4.13 Justification of Econometric Strategy

The data consist of observations on multiple PACS over multiple years. Therefore, the dataset has a panel structure combining cross-sectional and time-series dimensions. Panel-based econometric methods are thus appropriate for analysing performance dynamics. Therefore, the econometric techniques are used in this study in line with the structure of the dataset and the analytical objectives.

The analysis begins with pooled Ordinary Least Squares (OLS) regression. This model estimates the overall association between financial indicators and profitability under the assumption of homogeneous behaviour across PACS. Pooled OLS provides a baseline understanding of average relationships. However, it does not account for unobserved institutional heterogeneity among societies.

To address this limitation, panel regression models are subsequently estimated. The Fixed Effects (FE) model is applied to control for unobserved, time-invariant characteristics of individual PACS—such as managerial practices, governance quality, or local operating conditions—that may systematically influence profitability outcomes. By allowing each society to have its own intercept, the FE model isolates the impact of financial dimensions on profitability after accounting for such latent institutional effects.

In addition to continuous profitability measures, the study analyses profitability status as a binary outcome by classifying PACS as profit-making or loss-making. For this purpose, binary response models—logit and probit—are estimated. These models are appropriate when the dependent variable is dichotomous and enable estimation of the probability of a PACS being profitable based on its financial characteristics. Estimating both logit and probit models enhances robustness by ensuring consistency of results under alternative distributional assumptions.

Overall, this layered econometric strategy enables assessment of average effects, institutional heterogeneity, model specification validity, and discrete performance outcomes within a coherent analytical framework.

4.14 Reliability and Validity of the Study

The present study, used audited secondary data obtained from the CAMIS portal maintained by the Department of Cooperation, Government of Kerala. Reliability is therefore ensured by itself. As the financial statements of PACS are subject to statutory audit, consistency and accuracy of data across societies and years are reasonably ensured.

To ensure methodological reliability, the data has been undergone through standardised computation procedures. All derived financial indicators are calculated using uniform formulas. Z-score standardisation has been applied consistently across

societies and study years to maintain comparability and reproducibility. The use of established econometric techniques—such as pooled OLS, panel fixed effects and random effects models, and binary response models—further enhances analytical reliability by enabling cross-verification of findings across alternative specifications.

Validity is addressed at multiple levels. Construct validity is ensured through the multidimensional design of the GLOSP framework. Each dimension—Growth, Liquidity, Operational Efficiency, and Solvency—represents a theoretically grounded component of institutional performance. Content validity is reinforced by selecting indicators based on cooperative finance literature, regulatory guidelines, and their relevance to PACS functioning. Criterion consistency is examined through analysis of the relationship between GLOSP indices and profitability measures, thereby assessing the explanatory relevance of the framework.

4.15 Ethical Considerations

No personal information or primary survey data has been used for data collection. Ethical standards relating to data usage, confidentiality, and academic integrity have been strictly observed with the use of publicly available audited financial data.

4.16 Chapter Summary

This chapter details the research methodology adopted in the study. It describes the research design, data structure, sampling framework, variable operationalisation, index construction procedures, and econometric strategy used for the study. The methodological framework ensures the structured basis for the empirical examination of structural characteristics, financial determinants, and composite performance dynamics presented in the subsequent chapters.

Chapter 5

FINANCIAL STRUCTURE AND INDICATOR FRAMEWORK OF PACS IN KERALA

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CHAPTER V

FINANCIAL STRUCTURE AND INDICATOR FRAMEWORK OF PACS IN KERALA

5.1 Introduction

The data analysis follows a three-stage analytical strategy. At first, the structural characteristics of PACS, such as distributional patterns, scale variations, asset composition, and growth trends, are examined. In the second stage, distributional analysis, multidimensional performance profiling, correlation analysis, and principal component analysis are conducted, and then proceed to inferential modelling. Operationalization of the GLOSP framework is performed at the next stage, through the construction and evaluation of key financial indicators.

This chapter examines the financial and operational structure of the PACS and establishes the empirical foundation of the study, using the secondary data from the CAMIS database. Therefore, the analyses presented in this chapter are primarily descriptive and diagnostic in nature. It also provides the structural basis for the subsequent examination of profitability determinants in the following chapter.

5.1.1 Analytical Approach

The analytical approach followed in this chapter includes distributional analysis, quartile segmentation, and graphical visualization techniques. The purpose of this approach is to examine heterogeneity among PACS in size, asset composition, and financial aggregates. It identifies structural disparities across PACS' categories without implying causal inferences. Structural analysis of profit and loss PACS is also performed to understand the comparative differences. Further, the analysis proceeds with the construction of financial indicators using pooled five-year data. Summary statistics, temporal analysis, correlation assessment, and principal component analysis are employed to ensure analytical strength. This is meant to evaluate the multidimensional nature of performance indicators.

5.1.2 Distribution of Profit-Making and Loss-Making PACS

Table 5.1 shows the district-wise distribution of sample PACS. This provides the structural overview of performance heterogeneity within the sector.

Table 5.1 Distribution of PACS by Profit Status

District	Profit-making PACS	Loss-making PACS	Total PACS
Kasaragod	1	4	5
Kannur	1	5	6
Kozhikode	3	1	4
Malappuram	6	2	8
Wayanad	0	4	4
Idukki	1	2	3
Alappuzha	1	2	3
Palakkad	0	1	1
Kottayam	0	1	1
Thrissur	0	1	1
Total	**13**	**23**	**36**

Source: CAMIS database.

The distribution establishes the coexistence of profit-making and loss-making PACS in Kerala and reveals the significant share of loss-making PACS in the composition. This reflects that a substantial proportion of PACS remain loss-making, reflecting uneven financial outcomes across institutions. The presence of profit-making and loss-making PACS within the same districts underscores the presence of underlying financial and operational differentials among PACS. This heterogeneity is the empirical basis for the comparative and multivariate analyses undertaken in subsequent sections.

5.1.3 Structural Aggregates of PACS by Category

To examine the differences in financial scale and structural composition between profit-making PACS and loss-making PACS, the aggregate indicators related to deposits, advances, borrowings, and income components were analysed separately. Table 5.2 shows how profitability differences are associated with variances in operational scale and financial structure.

Table 5.2 Structural Aggregates by Profit Status

Indicator	Mean (Profit)	SD (Profit)	Mean (Loss)	SD (Loss)	Overall Mean
Members	12641.830	7523.789	7355.617	8064.741	9264.528
Paid-up Share Capital	173.015	142.878	55.505	27.587	97.939
Reserve Funds	91.125	75.781	6.967	15.589	37.357
Total Deposits	9272.662	5415.658	2457.704	2116.954	4918.661
Total Borrowings	672.627	1295.899	646.233	709.418	655.764
Total Loans to Members	17242.480	14083.060	4197.870	3075.634	8908.423
Cash at Bank	2986.523	1944.597	452.996	511.959	1367.881
Investments Valuation	10.420	32.675	5.274	12.745	7.132
Net Profit Loss	40.143	43.319	-721.640	975.188	-446.552
Working Capital	9849.969	6052.094	3012.122	1741.748	5481.344

Source: CAMIS database.

The structural aggregates reveal noticeable differences in scale and financial composition between profit-making and loss-making PACS. Profit-making societies have stronger deposit mobilization and income generation capacities, while loss-making PACS have weaknesses. These differences suggest that profitability is not merely an accounting outcome but is related to financial structure and operational scale. This signifies the indicator-based analysis in subsequent sections.

5.1.4 Distributional Characteristics of PACS Size

Table 5.3 presents the dispersion and distributional characteristics of key financial indicators based on their quartile distribution results. This facilitates the examination of performance heterogeneity among PACS categories, beyond average values.

Table 5.3 Quartile Distribution of Financial Indicators

Category	Statistic	Members	Total Assets	Total Loans	Total Deposits
Loss PACS	***Min***	714	230.11	96.05	217
	Q1	3254	1140.365	1786.5	1033.5
	Median	4785	2372.87	3548	1487
	Q3	7635.5	3616.83	6439.5	3616
	Max	40868	6796.71	12224	13107
Profit PACS	***Min***	2666	2621.87	1628	2101
	Q1	4850	5539.99	7458	5091
	Median	13176	8444.14	14488	7588
	Q3	18700	15222	21457	13670
	Max	25781	27594	57193	21085

Source: CAMIS database.

Table 5.3 reveals substantial variation across financial indicators, with marked dispersion between lower and upper performance segments. The presence of wide interquartile spreads in selected indicators shows uneven financial strength among PACS categories. This finding reinforces the evidence of structural heterogeneity observed in earlier analysis. The distributional disparities revealed here mandate the need for multidimensional and regression-based analytical strategies to identify the determinants underlying profitability differentials.

5.1.5 Boxplot of PACS Size Distribution

Chart 5.1 presents size distribution boxplots. This is to examine the dispersion and skewness in the size distribution of PACS. This helps to compare the central tendencies and variability across profit-making and loss-making societies.

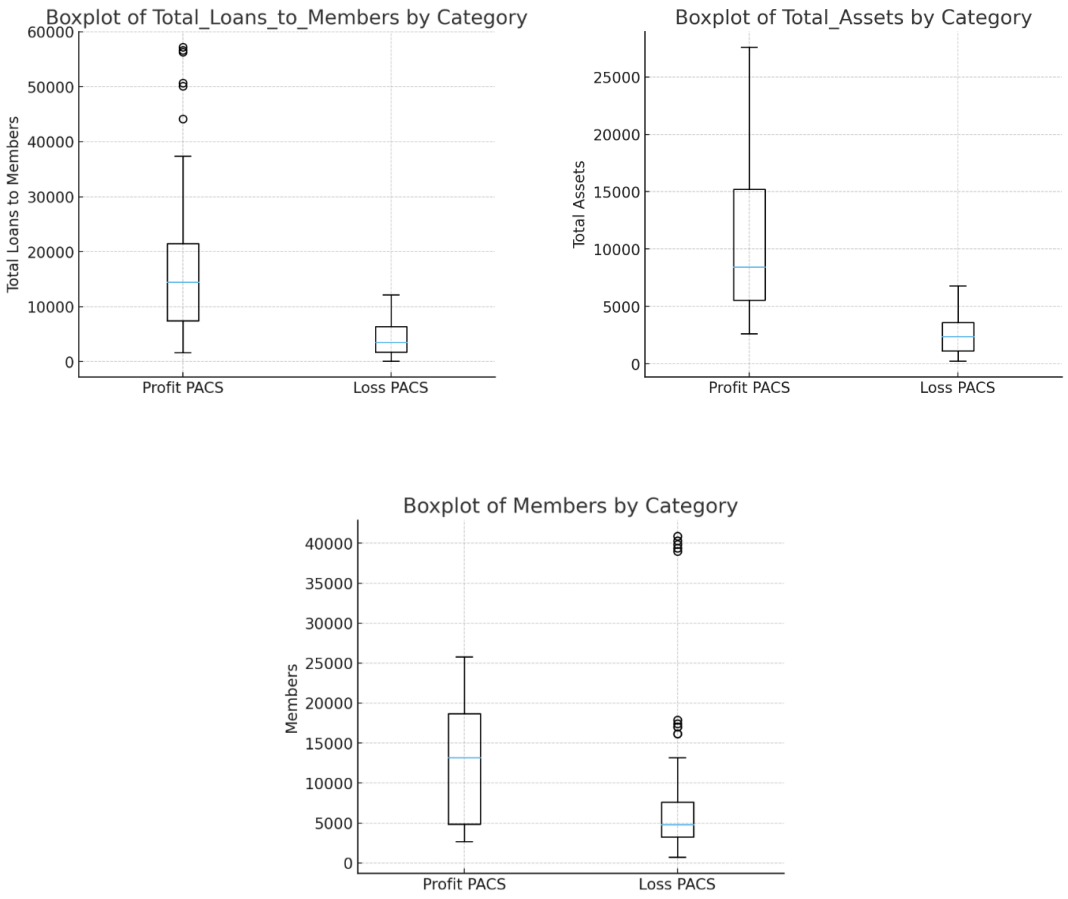

Chart 5.1 Size Distribution (Boxplot)

The boxplots reveal noticeable variation in the size distribution among PACS. Greater dispersion is visible among profit-making societies in selected structural indicators. This indicates uneven scale distribution across institutions. Thus, the structural heterogeneity identified in earlier sections is reinforced here. This evidence justifies the need for indicator-based and regression-oriented analysis in subsequent chapters.

5.1.6 Asset Composition of Sample PACS by Category

Table 5.4 shows the asset composition structure of PACS in both categories. This is to examine whether differences in profitability are associated with variations in asset structure. Allocation of funds across lending, liquid assets, and other asset categories is examined here.

Table 5.4 Asset Composition by Category

Category	Year	Cash at Bank	Investment Valuation	Outstanding Loans	Movables Immovable	Total Assets
Loss PACS	2020-2021	484.2900	5.1517	1958.3061	90.9787	2538.7265
	2021-2022	471.0478	5.3574	2006.5978	91.2683	2574.2713
	2022-2023	490.9413	4.4474	2018.5070	93.5948	2607.4904
	2023-2024	435.1766	5.9713	2058.0435	95.3165	2594.5079
	2024-2025	383.5222	5.4409	2130.4783	99.7483	2619.1896
Profit PACS	2020-2021	2730.7692	2.4100	6638.0000	107.1662	9478.3454
	2021-2022	2913.8462	14.9138	7115.3077	106.3192	10150.3869
	2022-2023	3150.0000	4.1208	7654.9231	135.8992	10944.9431
	2023-2024	2993.7692	15.3277	8461.5385	142.2915	11612.9269
	2024-2025	3144.2308	15.3277	9130.2308	149.5962	12439.3854

Source: CAMIS database.

The asset composition analysis makes it clear that the portfolio structure between profit-making and loss-making societies is different. Profit-making PACS make balanced allocations across earning and liquid assets, while loss-making societies opt for weaker asset allocations. This result points to the influences of composition structures on financial sustainability and profitability outcomes of PACS. It necessitates further indicator-based and multivariate examinations.

5.1.7 Trends in Deposits, Loans, and Borrowings

Chart 5.2 illustrates the sequential trends in deposits, loans, and borrowings of both categories of PACS during the study period. The chart provides a visual comparison of growth patterns of these indicators across profit-making and loss-making categories.

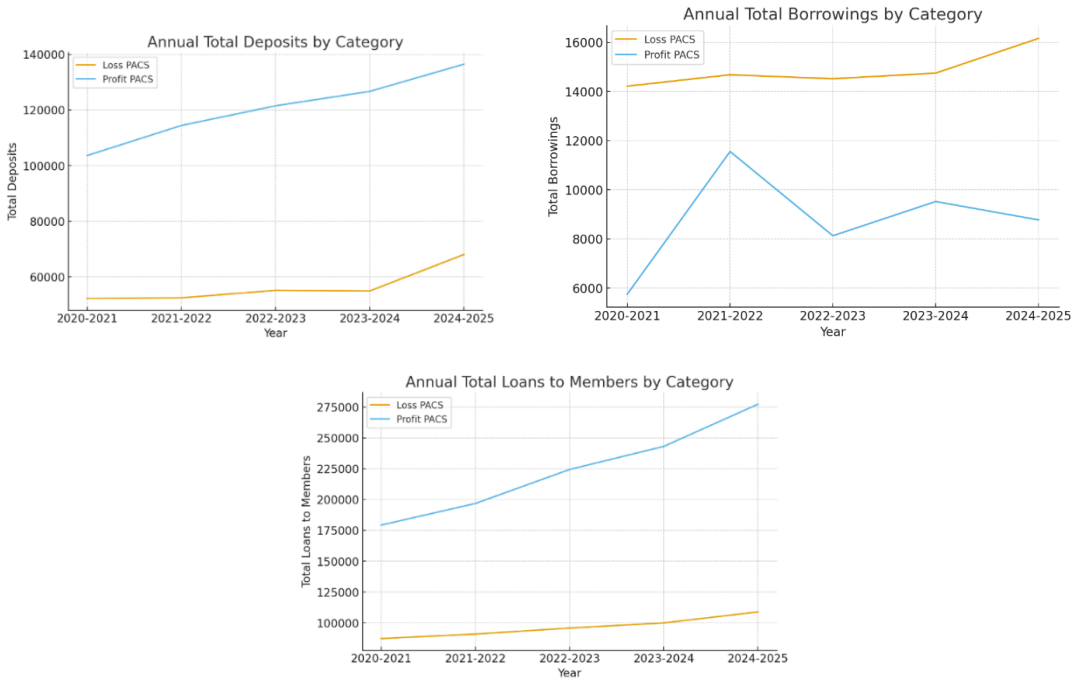

Chart 5.2 Trends in Financial Aggregates

The chart reveals the relatively stable and progressive trends in the financial aggregates of profit-making PACS. It is most evident in deposit mobilization and loan deployment. This clearly shows the positive association of fund management practices and lending operations in determining the financial viability of PACS. This also reinforces the structural differences identified in earlier sections.

5.1.8 Income Composition Heatmap

The below-given heatmap examines the composition and concentration of income sources across institutional categories. This facilitates a comparative assessment of revenue patterns between profit-making and loss-making PACS.

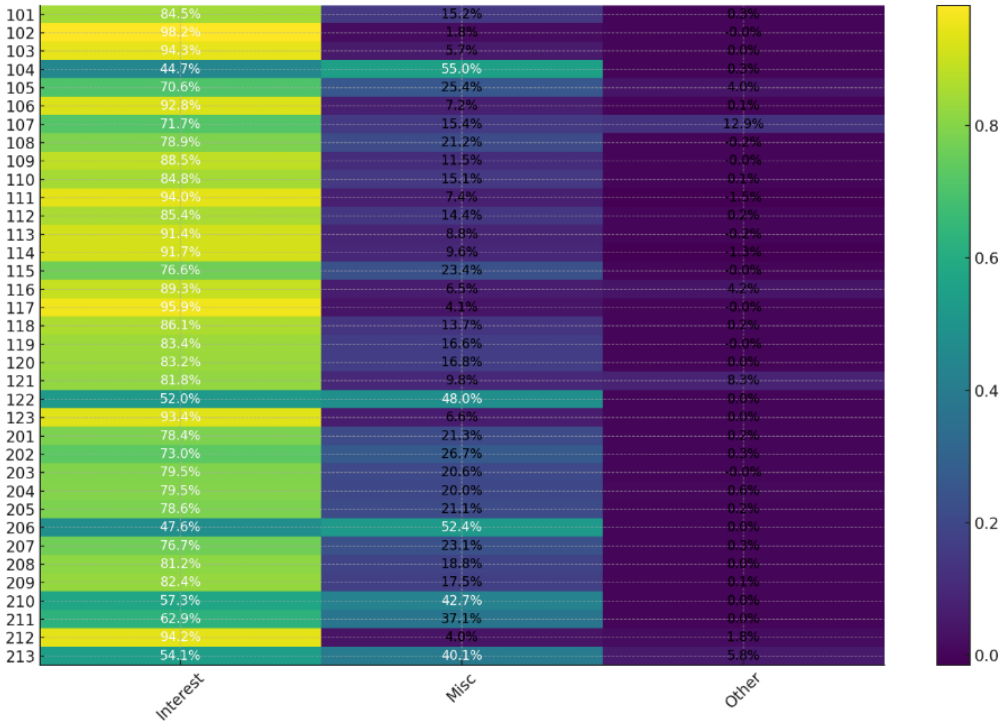

Chart 5.3 Proportion of income components (interest income, misc. income, other income) by PACS (latest year, with % labels)

The heatmap also exhibits differences in income concentration patterns across categories. While profit-making PACS effectively use diversified and stronger income streams, loss-making societies have weaker and less balanced revenue profiles. This proves that income structure and revenue profiles have key roles in deciding profitability. This requires the analysis of efficiency and operational indicators.

5.1.9 Discussion

The analysis proves that financial and operational structures have critical roles in differentiating performance dynamics and profitability outcomes at PACS. The study reveals that profitable PACS have larger membership bases, stronger deposit mobilization options, higher loan disbursement capacity, and more robust working capital positions. These structural advantages enable them to remain with better performance. On the other side, loss-making PACS have weaker economies of scale and comparatively lower performance dynamics.

The heterogeneity among categories of PACS indicates that the problems with loss-making PACS are not because of external factors only; internal structural

limitations also have significant roles in determining the performance of PACS. The findings recommend addressing structural weaknesses before analysing financial indicators and profitability factors.

These structural analyses underscore that the performance dynamics of PACS is not a single-factor phenomenon but a multidimensional impact.

5.1.10 Summary of Analysis

The structural analysis reveals that differential profitability outcomes among PACS are closely associated with variations in scale, structural strength, and financial stability. Both categories of PACS show significant differences in resource mobilisation, asset deployment, and balance-sheet composition. In short, the structural insights establish the institutional context within which performance dynamics operate. The analyses also necessitate more indicator-level and determinant analysis. These are done in subsequent sections.

The structural disparities observed in the preceding analysis indicate that differences in financial scale and composition alone do not fully explain performance outcomes. These variations necessitate a systematic examination of underlying financial indicators, which can capture the multidimensional dynamics influencing profitability and institutional sustainability.

5.2 Development and Empirical Structuring of the GLOSP Framework

The first phase of analysis revealed that the performance outcomes in PACS are shaped by the interaction of multiple factors rather than by isolated indicators. An analysis of various internal structural components of the profit and loss categories of PACS emphasized this. In continuation of this, in the second stage of analysis, the key financial indicators underlying the GLOSP framework—growth, liquidity, operational efficiency, solvency, and profitability dimensions—are evaluated over the study period. This evaluation is based on the recognition that performance outcomes in cooperative credit institutions are shaped by the interaction of multiple financial dimensions rather than isolated indicators.

5.2.1 Analytical Approach

The analytical approach at this level firstly constructs a comprehensive panel of financial ratios for each PACS over the study period. The financial indicators derived from this are analysed using descriptive statistics, trend analysis, correlation analysis, and principal component analysis (PCA). The basic purpose of the analysis is to empirically refine the framework and understand interrelationships among dimensions.

5.2.2 Construction of the Indicator Panel

The analysis proceeds with the construction of the complete panel of computed financial indicators for each sample PACS across the study period *(Ref: Annexure III: Indicator Panel for GLOSP Dimensions)*. The indicators are then grouped under the five GLOSP dimensions. Thus, the panel offers a complete and fair set of indicators that includes growth, liquidity position, operational efficiency, solvency strength, and profitability outcomes.

The panel includes:

- Growth Indicators: (MG, DG, LG, BG, PG)
- Liquidity Indicators: (CR, WCR, DLC)
- Operational Efficiency Indicators: (LWC, DR, OE, OCR)
- Solvency Indicators: (DE, CAP, FAR)
- Profitability Indicators: (NPM, ROWC, GPR, OCR)

This structured panel is the empirical dataset for subsequent descriptive, inferential, and multivariate analyses undertaken within this analytical framework.

Note: Certain indicators, particularly the Operating Cost Ratio (OCR), are analysed in multiple analytical contexts within the study. Although it is conceptually related to profitability, it is treated as an efficiency indicator within the GLOSP framework. Profitability indicators are analysed separately and excluded from the composite index to avoid endogeneity and double counting.

5.2.3 Summary Statistics of GLOSP Indicators

Table 5.5 shows the summary statistics of GLOSP indicators computed using pooled five-year data. The purpose is to examine the overall distributional characteristics of the constructed GLOSP indicators. The pooled *approach* enables a

consolidated assessment of central tendency and dispersion across financial dimensions.

Table 5.5 Summary Statistics of GLOSP Indicators (Pooled)

GLOSP Dimension	Indicator	PACS Category	Mean	Std. Dev.	Minimum	Maximum
Growth	MG	Profit	0.1187	0.4267	−0.4350	2.5720
		Loss	0.0517	0.3001	−0.7870	1.7521
	LG	Profit	0.0946	0.0592	-0.0007	0.2049
		Loss	0.0358	0.1502	-0.2279	0.8180
	DG	Profit	0.0863	0.0622	−0.1306	0.2670
		Loss	0.1343	0.6822	−0.6803	8.6731
	BG	Profit	0.3009	0.9786	−1.0000	7.0991
		Loss	3.2075	16.5539	−1.0000	234.2000
	PG	Profit	1.1242	2.2463	0.0046	18.4872
		Loss	0.2814	0.4608	0.0015	4.6416
Liquidity	CR	Profit	0.3629	0.1676	0.0117	0.7781
		Loss	0.2090	0.1843	0.0009	0.7770
	WCR	Profit	0.9198	0.0910	0.1091	1.0434
		Loss	1.2487	0.2428	0.7842	2.0985
	DLC	Profit	11.5966	15.7328	0.0390	70.0426
		Loss	3.5361	6.5123	0.0006	36.8360
Operational Efficiency	LWC	Profit	0.8441	0.6573	0.3933	8.9386
		Loss	0.6355	0.1476	0.1243	0.8961
	DR	Profit	0.2576	0.1146	0.0397	0.5240
		Loss	0.1632	0.1461	0.0127	0.7756
	OE	Profit	0.0173	0.0472	−0.0988	0.3547
		Loss	0.0425	0.1355	−0.0676	0.6817
	OCR	Profit	0.2959	0.4514	0.0682	6.3483
		Loss	0.3298	0.1216	0.1223	0.7524
Solvency	DE	Profit	2.7480	2.9098	0.0000	12.6954
		Loss	13.1066	13.3459	0.0000	40.5352
	CAP	Profit	0.0206	0.0178	0.0079	0.2238
		Loss	0.0211	0.0083	0.0098	0.0467
	FAR	Profit	0.0238	0.0251	0.0041	0.2137
		Loss	0.0307	0.0191	0.0041	0.0829
Profitability	NPM	Profit	0.0359	0.0248	0.0006	0.1084
		Loss	−3.0415	3.5463	−21.1985	−0.0510
	ROWC	Profit	0.0052	0.0066	0.0001	0.0757
		Loss	−0.2486	0.2668	−1.5345	−0.0067
	GPR	Profit	0.0362	0.0454	0.0014	0.3531
		Loss	0.0136	0.0412	−0.0109	0.1581

Source: CAMIS database.

The summary statistics show considerable variation across financial dimensions. While certain dimensions reveal relatively stable central tendencies,

others demonstrate wide ranges. However, noticeable dispersion is observed in liquidity and growth-related indicators. The inconsistency across indicators points to the multidimensional nature of institutional performance. This also supports the need for subsequent correlation and regression analysis to locate interrelationships and identify key determinants of profitability.

5.2.4. Temporal Behaviour of Key GLOSP Indicators

Chart 5.4 (a-e) examines the temporal behaviour of key GLOSP indicators over the study period. This is to identify the stability, volatility, and directional shifts across financial dimensions.

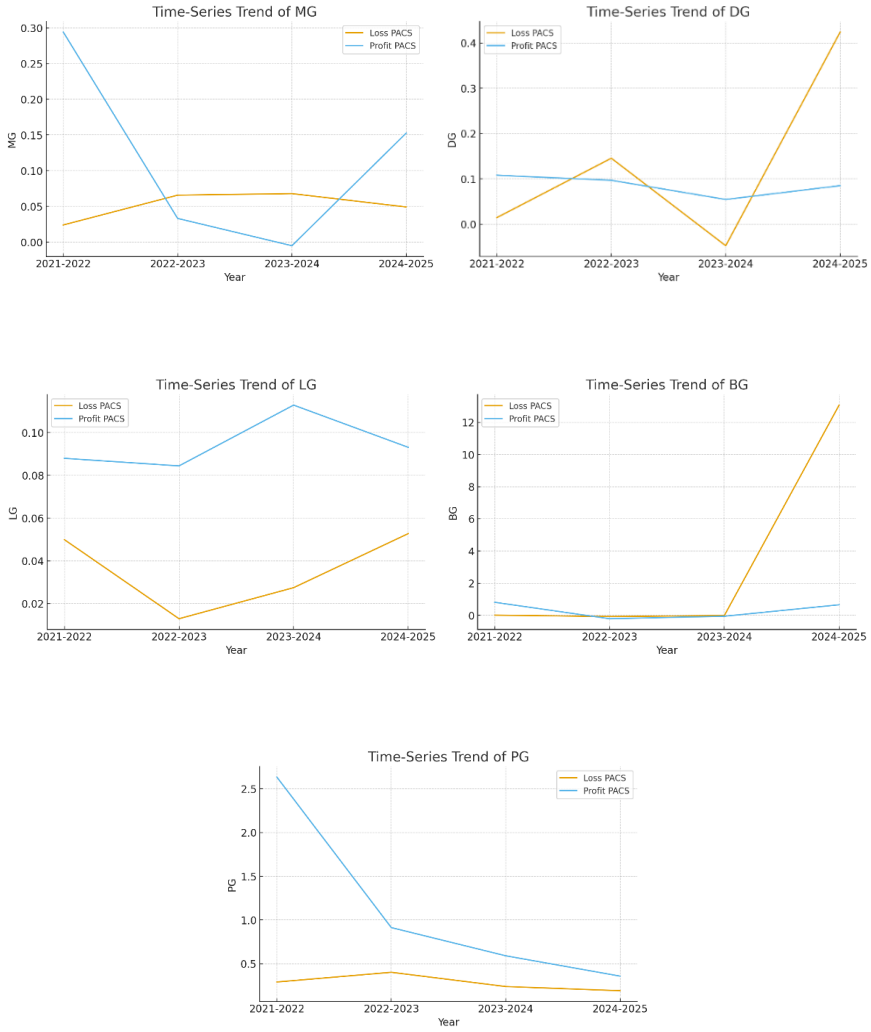

Chart 5.4(a) Time-Series Trends of Growth Indicators

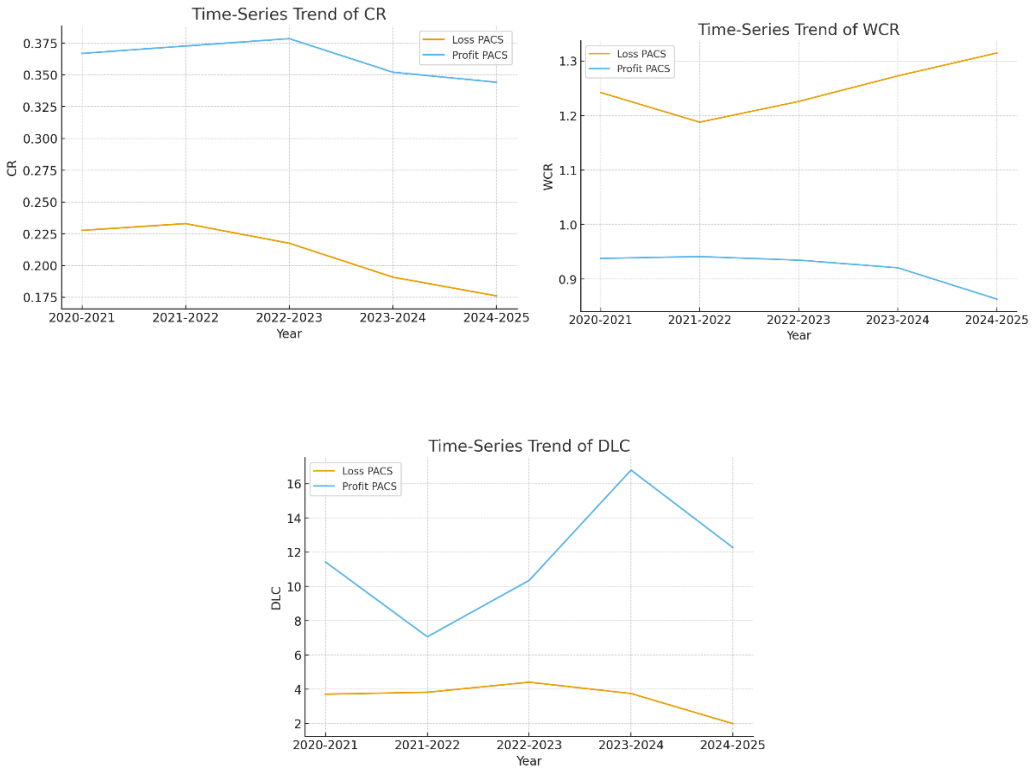

Chart 5.4(b) Time-Series Trends of Liquidity Indicators

Chart 5.4(c) Time-Series Trends of Operational Efficiency Indicators

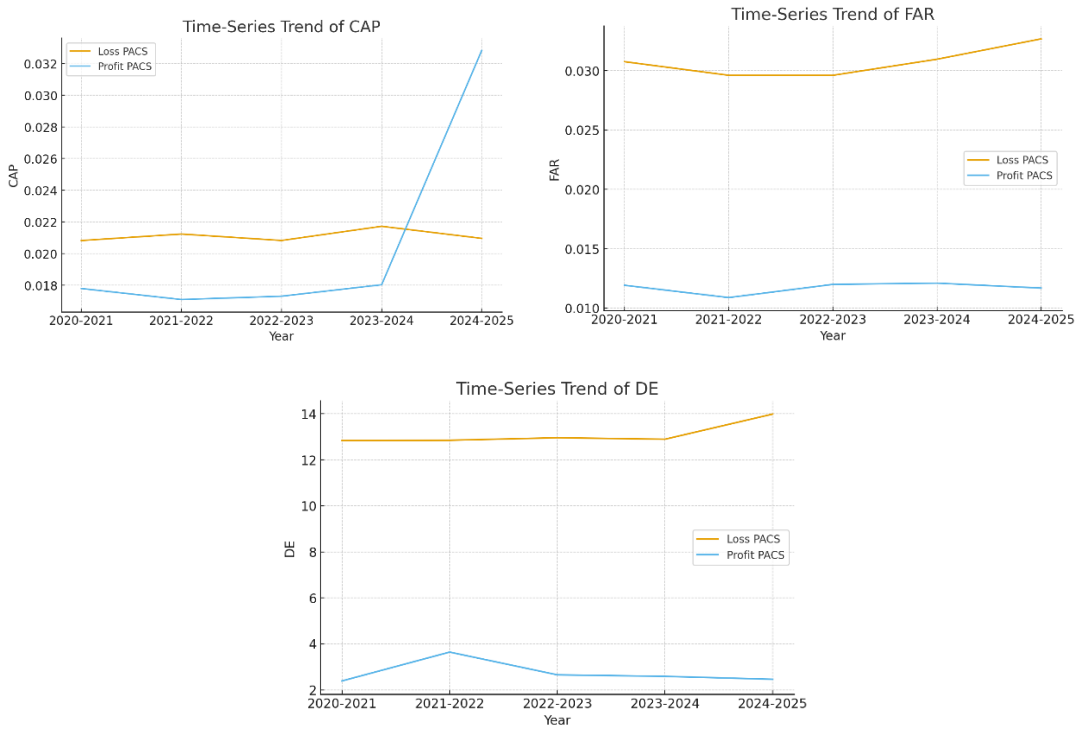

Chart 5.4 (d) Time-Series Trends of Solvency Indicators

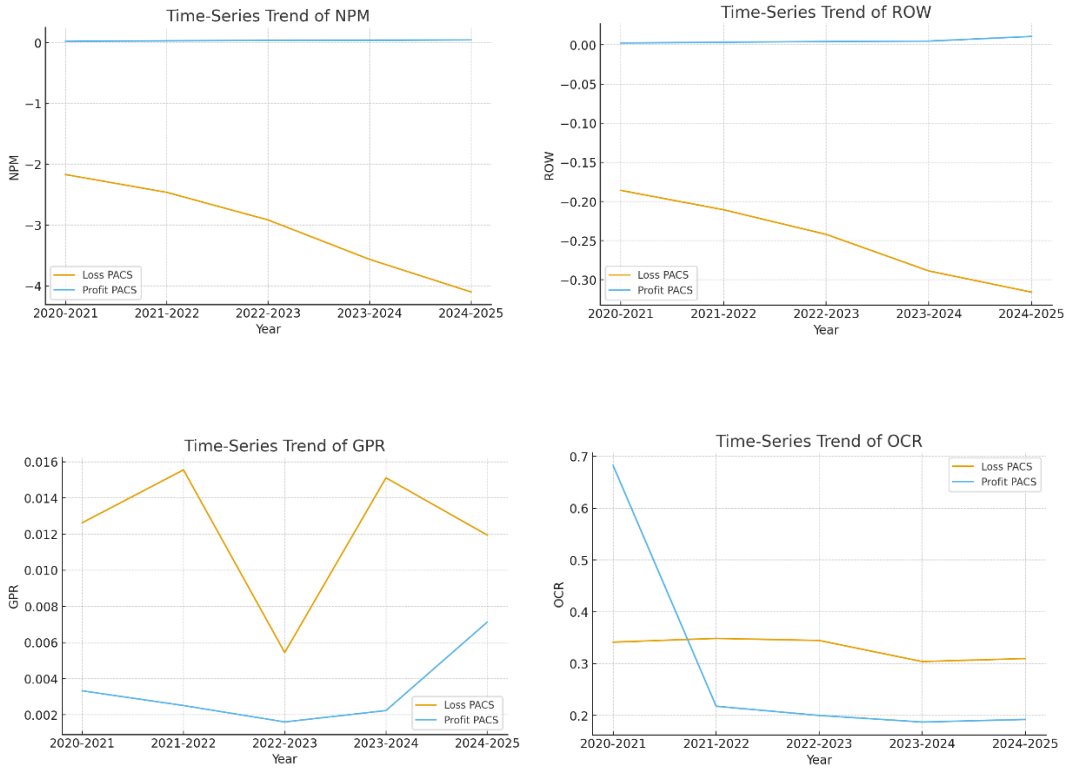

Chart 5.4(e) Time-Series Trends of Profitability Indicators

The chart reveals varying degrees of stability across financial dimensions over the period. Liquidity and solvency indicators show relatively stable trends, while growth-related measures show greater fluctuations over time. These dynamic patterns necessitate panel-based modelling to capture variations in profitability outcomes across PACS.

5.2.5 Multidimensional Performance Profiles

Chart 5.5 is the radar plot of GLOSP dimensions for profit-making and loss-making PACS. This is to make a comparative assessment of dimensional balance and relative strength across financial domains.

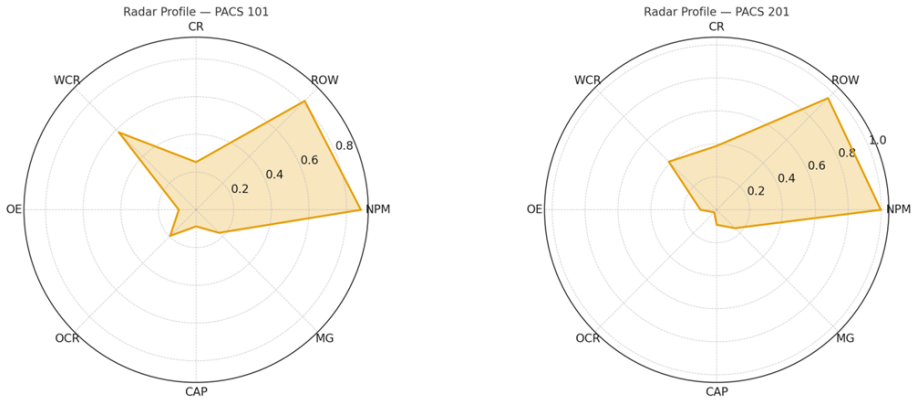

Chart 5.5 Radar Plot of GLOSP Dimensions

The chart shows distinct performance configurations across PACS categories. Profit-making PACS exhibit relatively balanced and stronger profiles across liquidity, efficiency, and growth dimensions, whereas loss-making societies display more uneven and constrained performance structures. The asymmetry in dimensional strength underscores the multidimensional character of financial sustainability and supports the relevance of composite modelling approaches adopted in subsequent sections.

5.2.6 Correlation Structure and Heatmap Analysis of Financial Indicators

To further examine internal consistency and dimensional structure among indicators, interrelationships and multivariate patterns are analysed using correlation matrix and heatmap analysis.

5.2.6.1 Correlation Matrix Table

A correlation analysis using pooled five-year data was carried out to examine the interrelationships among the selected GLOSP financial indicators and to assess potential multicollinearity issues. The results of the correlation analysis are presented in Table 5.6.

Table 5.6 Correlation Matrix of GLOSP Financial Indicators

Indicators	NPM	ROW	GPR	OCR	CR	WCR	DLC	LWC	DR	OE	DE	CAP	FAR	MG	DG	LG	BG	PG
NPM	1.000	0.9917*	0.125	−0.1749*	0.4843*	−0.7229*	0.2958*	0.136	0.4694*	0.132	−0.7018*	0.048	−0.5095*	0.034	−0.1259	0.5733*	0.036	0.132
ROW	0.9917*	1.000	0.095	−0.2130*	0.5017*	−0.7131*	0.2991*	0.1604*	0.4900*	0.106	−0.6936*	0.078	−0.5427*	0.041	−0.0849	0.5646*	0.022	0.139
GPR	0.125	0.095	1.000	0.026	−0.2143*	0.044	0.2353*	0.035	−0.0478	0.9602*	−0.0625	0.012	0.057	−0.0193	−0.0407	0.036	0.3468*	−0.0215
OCR	−0.1749*	−0.2130*	0.026	1.000	−0.2316*	0.3512*	−0.2486*	−0.0947	−0.2936*	−0.0407	0.1571*	−0.0407	0.2289*	−0.0425	−0.0765	−0.2139*	−0.0415	−0.1690*
CR	0.4843*	0.5017*	−0.2143*	−0.2316*	1.000	−0.4743*	0.2495*	−0.1411	0.8970*	−0.2011*	−0.2667*	−0.1661*	−0.4911*	0.054	−0.1081	0.3070*	−0.1120	0.1706*
WCR	−0.7229*	−0.7131*	0.044	0.3512*	−0.4743*	1.000	−0.3450*	−0.4510*	−0.4021*	0.029	0.6664*	−0.3027*	0.2828*	0.023	0.1841*	−0.6213*	0.039	−0.1839*
DLC	0.2958*	0.2991*	0.2353*	−0.2486*	0.2495*	−0.3450*	1.000	−0.0151	0.3746*	0.3126*	−0.4583*	−0.0901	−0.1741*	−0.0815	−0.0341	0.2161*	−0.0539	0.107
LWC	0.136	0.1604*	0.035	−0.0947	−0.1411	−0.4510*	−0.0151	1.000	−0.1328	0.048	−0.1263	0.9521*	−0.0458	−0.0960	−0.0263	0.074	−0.0049	0.006
DR	0.4694*	0.4900*	−0.0478	−0.2936*	0.8970*	−0.4021*	0.3746*	−0.1328	1.000	−0.0146	−0.3295*	−0.1702*	−0.4820*	−0.0014	−0.1086	0.2325*	−0.0014	0.2081*
OE	0.132	0.106	0.9602*	−0.0407	−0.2011*	0.029	0.3126*	0.048	−0.0146	1.000	−0.0959	0.029	0.048	−0.0067	−0.0366	0.034	0.4030*	−0.0094
DE	−0.7018*	−0.6936*	−0.0625	0.1571*	−0.2667*	0.6664*	−0.4583*	−0.1263	−0.3295*	−0.0959	1.000	−0.0512	0.3967*	0.076	0.1505*	−0.6073*	−0.0419	−0.1498*
CAP	0.048	0.078	0.012	−0.0407	−0.1661*	−0.3027*	−0.0901	0.9521*	−0.1702*	0.029	−0.0512	1.000	−0.0740	−0.0939	−0.0083	−0.0387	−0.0181	0.001
FAR	−0.5095*	−0.5427*	0.057	0.2289*	−0.4911*	0.2828*	−0.1741*	−0.0458	−0.4820*	0.048	0.3967*	−0.0740	1.000	0.008	−0.0605	−0.2911*	−0.0254	−0.0926
MG	0.034	0.041	−0.0193	−0.0425	0.054	0.023	−0.0815	−0.0960	−0.0014	−0.0067	0.076	−0.0939	0.008	1.000	0.004	−0.0388	−0.0090	−0.0189
DG	−0.1259	−0.0849	−0.0407	−0.0765	−0.1081	0.1841*	−0.0341	−0.0263	−0.1086	−0.0366	0.1505*	−0.0083	−0.0605	0.004	1.000	−0.0756	−0.0151	−0.0202
LG	0.5733*	0.5646*	0.036	−0.2139*	0.3070*	−0.6213*	0.2161*	0.074	0.2325*	0.034	−0.6073*	−0.0387	−0.2911*	−0.0388	−0.0756	1.000	0.068	0.036
BG	0.036	0.022	0.3468*	−0.0415	−0.1120	0.039	−0.0539	−0.0049	−0.0014	0.4030*	−0.0419	−0.0181	−0.0254	−0.0090	−0.0151	0.068	1.000	−0.0195
PG	0.132	0.139	−0.0215	−0.1690*	0.1706*	−0.1839*	0.107	0.006	0.2081*	−0.0094	−0.1498*	0.001	−0.0926	−0.0189	−0.0202	0.036	−0.0195	1.000

Source: Computed by the researcher using pooled five-year audited CAMIS data.

Note: indicates statistical significance at the 5 per cent level (two-tailed).

Correlation analysis is undertaken for diagnostic and exploratory purposes only and does not imply causality.

The correlation analysis reveals a moderate to high degree of interdependence among several financial indicators across growth, liquidity, operational efficiency, and solvency dimensions. Varying correlations are revealed here. This indicates that the indicators capture related, yet distinct, aspects of financial performance. However, more importantly, the observed correlation patterns do not suggest perfect multicollinearity. This supports the simultaneous inclusion of these indicators in subsequent multivariate analysis.

5.2.6.2 P-Value Matrix Table

A separate p-value matrix is also presented for all pairwise correlations among the financial indicators. *(Ref: Annexure IV: p Value Metrix Table of GLOSP Indicators)*. This complements the correlation matrix. The matrix shows that several correlations among liquidity, solvency, and profitability indicators are statistically significant at conventional levels, but many others are not. This variation reflects differences in the consistency and strengthens linear relationships across indicators.

5.2.6.3 Correlation Heatmap

The correlation structure is visually presented in the below-given heatmap (chart 5.6).

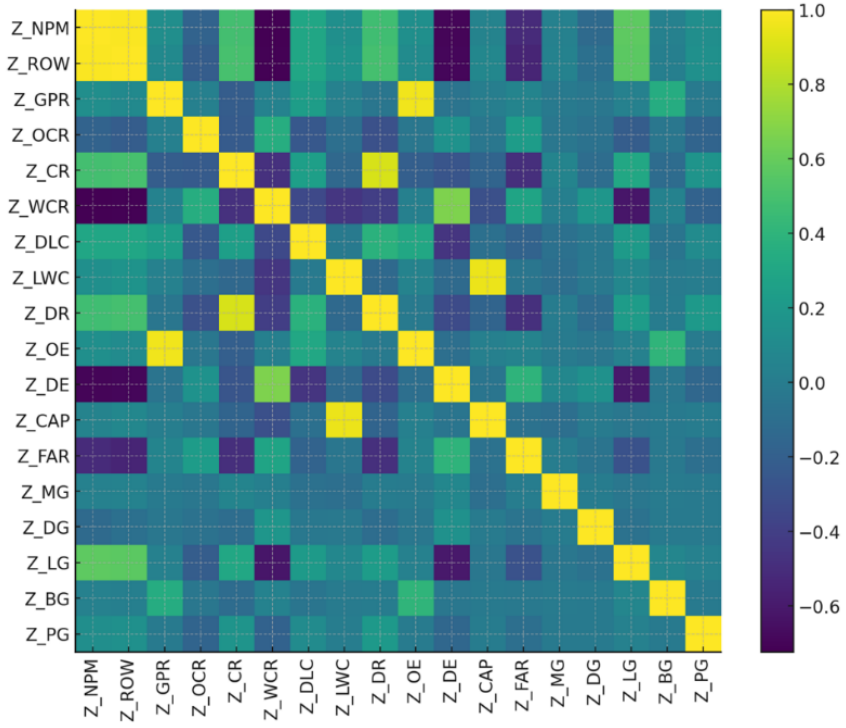

Chart 5.6 Correlation Structure (Heatmap)

The heatmap substantiates the patterns observed in the correlation analysis by visually highlighting clusters of related financial dimensions. Several indicators exhibit moderate inter-correlations, indicating the presence of structural interdependence among financial variables. Considering the bivariate nature of correlation analysis, these associations are interpreted as indicative rather than conclusive. The result supports regression-based modelling to isolate independent effects.

5.2.7 Principal Component Analysis of Financial Indicators

To examine the underlying structure and dimensionality of the selected financial indicators, Principal Component Analysis (PCA) is done on the financial indicators.

5.2.7.1 Principal Component Analysis: Eigenvalue Table

Table 5.7 summarises the PCA eigenvalues and the variance explained by each principal component.

Table 5.7 PCA Eigenvalues and Variance Explained

Component	Eigenvalue	Variance Explained_%	Cumulative_%
PC1	5.191	28.582	28.582
PC2	2.473	13.618	42.200
PC3	2.207	12.152	54.353
PC4	1.268	6.979	61.332
PC5	1.114	6.132	67.464
PC6	1.054	5.804	73.268
PC7	0.993	5.468	78.736
PC8	0.926	5.097	83.833
PC9	0.858	4.723	88.556
PC10	0.582	3.207	91.763
PC11	0.572	3.152	94.915
PC12	0.429	2.360	97.275
PC13	0.236	1.298	98.573
PC14	0.144	0.795	99.368
PC15	0.060	0.330	99.698
PC16	0.030	0.164	99.863
PC17	0.021	0.114	99.976
PC18	0.004	0.024	100.000

Source: CAMIS database.

The eigenvalue show that multiple components contribute meaningfully to the total variance; but with no single component dominating the explanatory power. This confirms that the indicators capture distinct yet related aspects of financial performance and supports the use of a multidimensional analytical framework.

5.2.7.2 PCA Component Significance Diagnostics

Table 5.8 further evaluated the statistical relevance of extracted components.

Table 5.8 PCA Component Significance Diagnostics

Component	Eigenvalue	Variance Explained (%)	Cumulative Variance (%)
PC1	5.101	28.18	28.18
PC2	2.974	16.43	44.61
PC3	2.816	15.55	60.16
PC4	1.392	7.69	67.85
PC5	1.140	6.29	74.14
PC6	1.013	5.59	79.74

Source: CAMIS database
Note: Follows Kaiser's criterion.

As per the PCA component significance diagnostics table, six components exceed the Kaiser retention threshold (eigenvalue > 1), jointly explaining 79.74 percent of total variance. The result indicates that variance is not dominated by a single latent factor. The first component alone explains only 28.18 percent, and the gradual accumulation of explained variance across components confirms that financial performance is structurally multidimensional rather than unidimensional. Overall, the PCA indicates that performance variation is not at all concentrated in a single dominant factor, but it is distributed across multiple latent dimensions.

5.2.7.3 PCA Dimensional Structure Summary

Table 5.9 shows the PCA dimensional structure summary. This table enables interpretation of component patterns.

Table 5.9 PCA Dimensional Structure Summary

Variable	PC1	PC2	PC3	PC4	PC5	PC6
Z_NPM	−0.492	−0.071	0.002	0.031	0.199	−0.073
Z_ROWC	−0.480	−0.061	−0.023	0.077	0.183	−0.056
Z_GPR	−0.074	0.179	**0.601**	0.019	−0.052	−0.016
Z_CR	−0.206	−0.214	−0.124	0.000	−0.031	0.173
Z_WCR	0.299	−0.077	0.110	0.079	0.053	0.027
Z_DLC	−0.217	−0.072	0.180	0.015	**−0.634**	−0.220
Z_LWC	−0.147	**0.654**	−0.208	0.006	−0.053	0.017
Z_OE	−0.088	0.184	**0.613**	0.028	−0.080	0.004
Z_DE	0.378	0.041	−0.008	0.053	0.074	0.163
Z_CAP	−0.091	**0.624**	−0.211	0.030	−0.029	0.069
Z_FAR	0.258	0.090	0.087	−0.243	−0.153	−0.152
Z_DG	0.087	0.000	−0.023	**0.959**	−0.078	−0.059
Z_BG	−0.024	0.084	0.323	0.042	**0.520**	0.390
Z_PG	−0.093	−0.048	−0.033	−0.004	−0.404	**0.808**

Source: CAMIS database

Table 5.9 demonstrates systematic clustering of indicators across components. The result reveals that profitability indicators load strongly on PC1. Similarly, liquidity and capital indicators load on PC2, operational efficiency variables on PC3, and growth-related indicators dominate later components. This pattern confirms that the indicator system contains multiple distinct performance dimensions. However, cross-loadings remain limited, and this reveals structural independence across dimensions. In brief, these patterns empirically validate and support the conceptual separation underlying the GLOSP framework.

5.2.7.4 Scree Plot of Principal Components

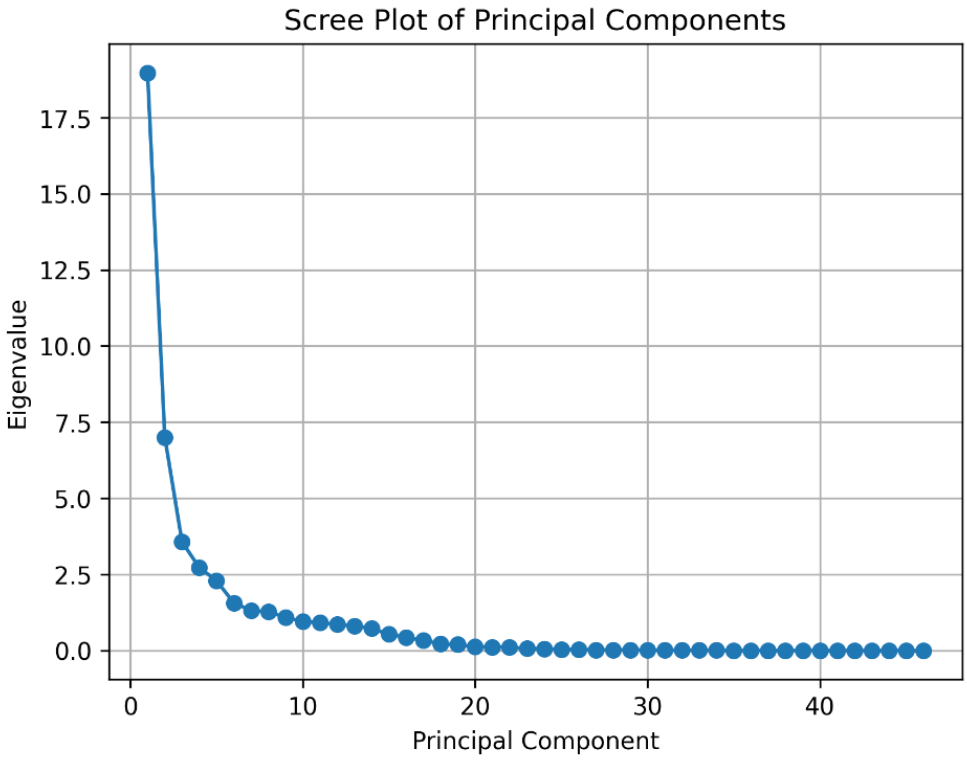

Chart 5.7 Scree Plot of Principal Components

The scree plot shows a clear elbow after the sixth component, beyond which eigenvalues decline gradually. This confirms that six components capture the substantive variance structure of the dataset, and the subsequent components contribute only marginal explanatory value. Altogether the graphical evidence therefore supports the multidimensional structure of financial indicators.

5.2.7.5 Principal Component Analysis: Factor Loadings Table

Table 5.10 shows the PCA component loadings. The table examines the dimensional structure underlying the selected financial indicators. This is to ensure whether the indicators converge around a dominant component or exhibit multidimensional variation.

Table 5.10. PCA Component Loadings—Part 1

Indicators	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
NPM	-0.392	0.057	-0.009	-0.213	0.137	-0.010	-0.018	-0.002	0.190
ROWC	-0.396	0.042	0.010	-0.166	0.165	0.008	-0.022	-0.014	0.190
GPR	-0.024	0.516	-0.324	0.071	0.003	-0.078	-0.035	-0.124	0.127
OCR	0.167	0.019	-0.007	-0.488	-0.056	-0.164	-0.363	-0.106	0.544
CR	-0.297	-0.319	-0.105	0.192	0.024	-0.252	-0.210	-0.107	-0.064
WCR	0.368	-0.061	-0.223	0.059	0.100	0.023	-0.177	-0.033	0.132
DLC	-0.213	0.107	-0.197	0.198	-0.410	0.222	0.141	-0.395	-0.048
LWC	-0.080	0.305	0.548	0.166	0.018	-0.109	-0.045	-0.086	-0.018
DR	-0.300	-0.221	-0.187	0.301	-0.038	-0.243	-0.243	-0.108	-0.070
OE	-0.037	0.525	-0.330	0.122	-0.001	-0.070	-0.010	-0.118	0.069
DE	0.344	-0.090	-0.011	0.258	0.133	-0.198	-0.091	-0.064	-0.069
CAP	-0.037	0.285	0.551	0.202	0.054	-0.141	-0.118	-0.094	0.046
FAR	0.269	0.104	0.008	-0.152	-0.331	-0.052	0.358	0.030	-0.144
MG	0.007	-0.071	-0.075	-0.039	0.517	-0.394	0.643	-0.260	0.103
DG	0.066	-0.031	0.004	0.313	0.438	0.682	0.000	-0.064	0.264
LG	-0.295	0.040	0.009	-0.328	0.041	0.253	0.153	0.194	-0.221
BG	-0.008	0.289	-0.204	0.030	0.323	-0.132	-0.196	0.550	-0.335
PG	-0.103	-0.055	-0.013	0.363	-0.275	-0.118	0.290	0.588	0.559

PCA Component Loadings—Part 2

Indicators	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC18
NPM	0.004	-0.158	-0.385	0.205	0.133	0.008	-0.007	0.080	-0.709
ROWC	-0.015	-0.150	-0.379	0.203	0.243	0.031	0.040	-0.100	0.686
GPR	0.053	-0.286	0.132	-0.105	-0.152	-0.067	0.665	0.040	0.004
OCR	0.292	0.335	0.195	0.087	-0.095	-0.078	-0.058	0.036	0.035
CR	0.334	-0.046	0.141	-0.013	-0.145	0.609	0.088	-0.320	-0.047
WCR	-0.265	0.015	0.072	-0.017	0.733	0.176	0.120	-0.278	-0.106
DLC	-0.072	0.527	-0.001	0.417	0.068	0.038	0.080	0.015	-0.012
LWC	0.099	0.069	0.063	0.036	0.051	-0.316	0.016	-0.648	-0.092
DR	0.249	0.051	0.041	-0.288	0.322	-0.535	-0.057	0.239	0.011
OE	0.028	-0.170	0.081	-0.086	0.000	0.136	-0.713	-0.068	0.020
DE	0.201	-0.322	0.020	0.737	-0.036	-0.152	-0.053	0.132	0.020
CAP	-0.007	0.080	0.098	-0.048	0.249	0.378	0.045	0.547	0.031
FAR	0.647	-0.039	-0.328	-0.124	0.274	0.107	0.048	-0.015	-0.002
MG	-0.020	0.235	0.128	-0.033	0.019	-0.026	0.013	0.009	-0.006
DG	0.382	0.080	-0.036	-0.095	-0.050	-0.001	-0.005	0.016	-0.018
LG	0.190	-0.154	0.668	0.197	0.284	-0.031	-0.009	0.034	-0.008
BG	0.105	0.496	-0.144	0.127	-0.012	0.033	0.066	0.000	0.002
PG	-0.013	0.007	0.117	0.081	0.027	0.007	0.002	-0.018	-0.005

Source: CAMIS database.

The analysis clearly shows that financial indicators cluster across multiple components rather than forming a single dominant dimension. Even though some indicators load strongly on specific components, no single dimension explains the majority of variance in financial performance. This also confirms the multidimensional nature of PACS.

5.2.7.6 PCA Component 1 Loadings: Visual Representation

Chart 5.8 is the visual interpretation of the principal component structure. It exhibits the relative contribution of financial indicators to the dominant variance component.

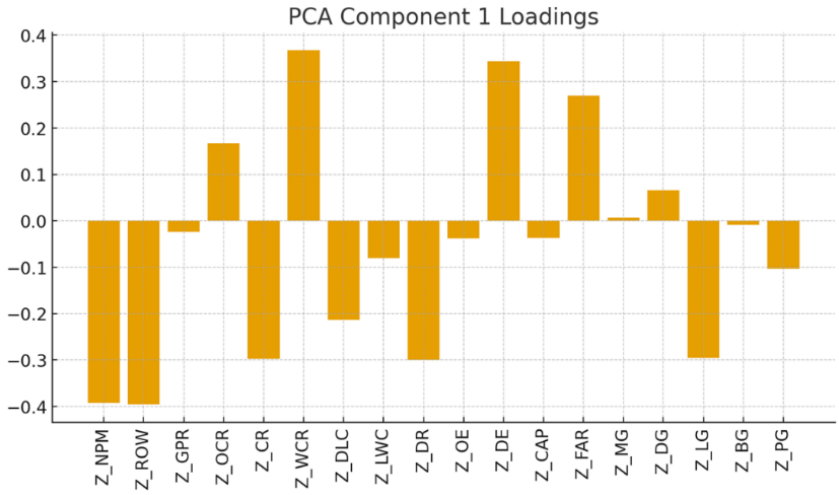

Chart 5.8 PCA Component Loadings

Chart 5.8 also indicates that the distribution of contributions is not concentrated within a single financial dimension. Even though certain indicators exhibit relatively stronger loadings on the first principal component, together the chart does not indicate the dominance of any indicator. This result reinforces the conclusion that PACS financial performance is inherently multidimensional.

5.2.8 Discussion

The analysis done in this section together establishes that the financial performance among PACS is multidimensional. It is the result of the interaction of growth, liquidity, operational efficiency, and solvency dimensions. Stronger liquidity positions, higher operational efficiency, and better solvency profiles are visible among profit-making PACS. The loss-making PACS exhibit compounded weaknesses and

higher variability. Growth indicators, even though relevant, do not independently explain profitability outcomes. Still some aspects underscore the importance of efficiency and financial discipline. In short, the evidences from descriptive statistics, trend analysis, correlation analysis, and PCA reinforces the coherence and multidimensional structure of the GLOSP performance framework.

5.2.9 Summary of Analysis

The analysis undergone in the chapter systematically evaluated the financial indicators underlying the GLOSP framework across growth, liquidity, operational efficiency, and solvency dimensions, with profitability examined as an outcome variable. Diagnostic assessments confirm the multidimensional nature of PACS. These findings thus provide a structured empirical foundation for composite index construction and for subsequent econometric examination of profitability dynamics in the following chapter.

Chapter 6

PERFORMANCE DYNAMICS AND PROFITABILITY OUTCOMES OF PRIMARY AGRICULTURAL CREDIT SOCIETIES IN KERALA

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CHAPTER VI

PERFORMANCE DYNAMICS AND PROFITABILITY OUTCOMES OF PRIMARY AGRICULTURAL CREDIT SOCIETIES IN KERALA

6.1 Introduction

Previous sections described the structural characteristics of the PACS categories and operationalized the multidimensional performance framework. This chapter examines how variations in financial dimensions are associated with the profitability outcomes among profit-making and loss-making PACS. In short, this chapter analyses the financial determinants of profitability and distress of the aforesaid categories of PACS.

Whatever may be the financial outcome—profit or loss—it is the result of underlying liquidity, growth, efficiency, solvency, and portfolio conditions rather than isolated indicators. Therefore, the present analyses focus on explanatory assessment and examine how financial configurations relate to sustained profitability or persistent loss. It adopts a multistage analytical strategy involving comparative assessments, association analyses, and econometric modelling.

Both parametric and non-parametric techniques are used for analysis. Mean difference tests, effect size measures, regression-based models—including pooled OLS, panel fixed-effects and random-effects specifications, and binary logit and probit models—are used at this stage to analyse continuous profitability measures and categorical profit–loss status.

However, this chapter presents only explanatory and diagnostic empirical analyses. Statistical significance is interpreted as evidence of structural association rather than causal inference. The findings are synthesised to identify consistent determinants of performance dynamics of PACS.

6.2 Mean Difference Tests for GLOSP Indicators

Table 6.1 shows the results of the mean differences test conducted in GLOSP indicators. This is to examine whether financial performance dimensions differ systematically between profit-making and loss-making PACS.

Table 6.1 Mean Differences in GLOSP Indicators

Performance Dimension / Indicator	Mean (Profit PACS)	Mean (Loss PACS)	Mean Difference	Effect Size (Cohen's d)	Significance (5%)
Growth Index (GIndex)	0.152	−0.043	0.195	0.383	*
Liquidity Index (LIndex)	0.292	−0.019	0.311	0.785	*
Operational Efficiency Index (OIndex)	−0.294	0.171	−0.465	−1.086	*
Solvency Index (SIndex)	−0.265	0.257	−0.522	−0.800	*
Return on Working Capital (ROWC)	0.006	−0.264	0.270	1.219	*
Net Profit Margin (NPM)	0.039	−3.260	3.299	1.070	*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

The mean difference test results indicate that profit-making PACS have significantly stronger performance in working capital adequacy, cost efficiency, and deposit mobilisation compared to loss-making PACS. However, growth indicators show comparatively modest differences.

6.3 Forest plot of Differences

Chart 6.1 is the visual presentation of the mean difference test results.

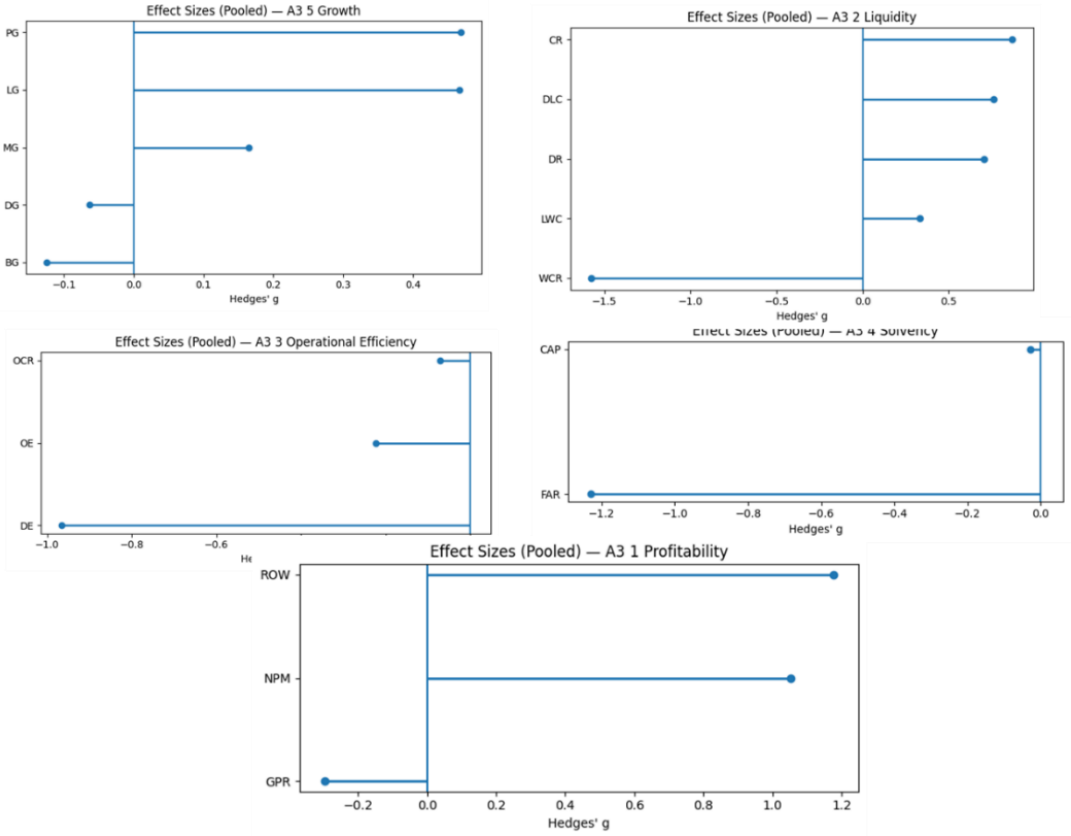

Chart 6.1 Forest Plot of Mean Differences

Chart 6.1 exhibits significant differences in working capital adequacy, operating cost efficiency, and deposit growth among profit-making PACS. The modest differences in operational efficiency and growth-related indicators are also visible.

6.4 Robustness through Non-Parametric Tests

Tables 6.2(a) to 6.2(e) report the results of non-parametric tests employed for selected GLOSP indicators across key financial dimensions. This is to assess the robustness of the observed mean differences without relying on distributional assumptions.

Table 6.2 (a): Non-Parametric Robustness Tests—Growth

Indicator	Median (Profit PACS)	Median (Loss PACS)	Mann–Whitney U	p-value	Sig. (5%)
Membership Growth (MG)	0.0381	0.0245	173.0	0.4488	—
Deposit Growth (DG)	0.0952	0.0343	215.0	0.0323	*
Loan Growth (LG)	0.0992	0.0089	231.0	0.0076	*
Borrowing Growth (BG)	0.1024	0.0007	146.0	0.0453	*
Profit Growth (PG)	0.3722	0.1787	222.0	0.0177	*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

Table 6.2(b): Non-Parametric Robustness Tests—Liquidity

Indicator	Median (Profit PACS)	Median (Loss PACS)	Mann–Whitney U	p-value	Sig. (5%)
Cash Ratio (CR)	0.3375	0.1647	244.0	0.0020	*
Working Capital Ratio (WCR)	0.9264	1.2554	18.0	<0.001	*
Deposit–Loan Coverage (DLC)	6.2517	0.6287	159.0	0.0101	*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

Table 6.2(c): Non-Parametric Robustness Tests—Operating Efficiency

Indicator	Median (Profit PACS)	Median (Loss PACS)	Mann–Whitney U	p-value	Sig. (5%)
Loans-to-Working Capital (LWC)	0.7450	0.6644	210.0	0.0481	*
Operating Efficiency (OE)	0.0163	0.0030	165.0	0.6213	—
Operating Cost Ratio (OCR)	0.2024	0.3058	52.0	0.0014	*
Diversification Ratio (DR)	0.2296	0.1178	235.0	0.0051	*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

Table 6.2(d): Non-Parametric Robustness Tests—Solvency

Indicator	Median (Profit PACS)	Median (Loss PACS)	Mann–Whitney U	p-value	Sig. (5%)
Debt–Equity Ratio (DE)	1.7922	7.9949	84.5	0.0332	*
Capital Adequacy Proxy (CAP)	0.0176	0.0191	124.0	0.4103	—
Fixed Asset Ratio (FAR)	0.0102	0.0274	46.0	0.0007	*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

Table 6.2(e): Non-Parametric Robustness Tests—Profitability

Indicator	Median (Profit PACS)	Median (Loss PACS)	Mann–Whitney U	p-value	Sig. (5%)
Net Profit Margin (NPM)	0.0290	−1.7929	299.0	<0.001	*
Return on Working Capital (ROWC)	0.0035	−0.1592	299.0	<0.001	*
Gross Profit Ratio (GPR)	0.0026	0.0008	159.0	0.7669	—

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

The test results consistently confirm statistically significant differences between profit-making and loss-making PACS, especially in working capital adequacy, operating cost efficiency, and deposit growth; Operational efficiency and growth indicators exhibit only inconsistent differences. The combined results of parametric and non-parametric tests reinforce the robustness of the identified performance differentials.

These findings confirm that the observed group-wise differences are not sensitive to distributional assumptions. This strengthens the empirical basis for the subsequent regression analysis.

6.5 Correlation of Financial Indicators with Profitability Measures (ROWC and NPM)

Table 6.3 shows the results of correlation analysis conducted on financial indicators with profitability measures. *Return on Working Capital (ROWC)* and *Net*

Profit Margin (NPM) are alternative profitability measures used for the analysis. This is to examine the direction and strength of association between financial indicators and profitability.

The analysis is conducted at the dimension level to avoid redundancy arising from high intercorrelation among individual financial ratios and also to provide a clear, interpretable overview of the directional association between structural performance characteristics and profitability outcomes PACS.

Table 6.3 Correlation with Profitability Measures

GLOSP Dimension	Return on Working Capital (ROWC)	Net Profit Margin (NPM)
Growth Index (GIndex)	0.235*	0.217*
Liquidity Index (LIndex)	0.392*	0.351*
Operational Efficiency Index (OIndex)	−0.373*	−0.360*
Solvency Index (SIndex)	−0.313*	−0.302*

Source**:** CAMIS database. Note**:** * indicates statistical significance at the 5 percent level.

The correlation results indicate that profitability has a positive relationship with indicators reflecting working capital adequacy, cost efficiency, and deposit mobilisation. Similarly, adverse relationships are observed for indicators involving higher operating costs and weak liquidity positions. It is also observed that the magnitude and direction of correlations vary across profitability measures, ROWC, and NPM.

Considering the bivariate nature of correlation analysis and the presence of interrelationships among financial indicators, these results are interpreted as indicative rather than conclusive. Accordingly, regression models employed in subsequent sections will attempt to isolate the independent influence of financial dimensions on profitability outcomes.

6.6 Pooled OLS Regression on Average Profitability

To examine the structural determinants of profitability across PACS, pooled OLS regression models are estimated using five-year averaged data. Averaging across

time reduces short-term volatility and allows the analysis to focus on persistent cross-sectional differences in performance. Composite indices representing operational efficiency, liquidity, solvency, and growth are employed to ensure parsimony and to avoid multicollinearity among individual financial ratios. Two alternative profitability measures—*ROWC and NPM*—are considered to assess robustness across definitions.

Table 6.4: Pooled OLS Estimates (ROWC)

Variable	Coefficient	Std. Error	t-value	p-value	Significance
Constant	-0.160	0.036	-4.44	0.000	
Growth Index (GIndex)	0.156	0.126	1.24	0.225	—
Liquidity Index (LIndex)	0.102	0.114	0.90	0.376	—
Operational Efficiency Index (OIndex)	-0.165	0.078	-2.11	0.043	**
Solvency Index (SIndex)	-0.097	0.072	-1.34	0.190	—

Model Diagnostics

Statistic	Value
R^2	0.384
Adjusted R^2	0.305
F-Statistic	4.83
Prob (F-Statistic)	0.0038
Observations	36
Durbin–Watson	2.38

Source: CAMIS database. Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables. Results significant at the 5 percent level are interpreted as robust.

The results reported in Table 6.4 indicate that operational efficiency is the only dominant cross-sectional determinant, exhibiting a statistically robust association with ROWC. This suggests the dominating influence of efficiency-related factors in the profitability of PACS. It also means that, influence of other determinants – liquidity, solvency and growth - on average profitability is either indirect or context-dependent.

Table 6.5: Pooled OLS Estimates (NPM)

Variable	Coefficient	Std. Error	t-value	p-value	Significance
Constant	-1.969	0.478	-4.12	0.000	
Growth Index (GIndex)	2.065	1.668	1.24	0.225	—
Liquidity Index (LIndex)	1.200	1.510	0.80	0.433	—
Operational Efficiency Index (OIndex)	-2.151	1.033	-2.08	0.046	**
Solvency Index (SIndex)	-1.075	0.961	-1.12	0.272	—

Model Diagnostics

Statistic	Value
R^2	0.355
Adjusted R^2	0.271
F-Statistic	4.26
Prob (F-Statistic)	0.0073
Observations	36
Durbin–Watson	2.48

Source: CAMIS database.
Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

Table 6.5 shows the results of pooled OLS estimates using NPM as dependent variable. Similar to previous estimates, operational efficiency again emerges as the only robust dominant cross-sectional determinant of profitability. The consistency of the result reinforces the structural importance of efficiency in shaping the financial performance of PACS. At the same time, they suggest that other financial dimensions may operate through time-varying or within-institution dynamics, which are examined further in the subsequent panel analysis.

6.6.3 Comparative Interpretation of Table 6.4 and Table 6.5

In together, operational efficiency exhibits a statistically significant cross-sectional association with average profitability in both models. In contrast, liquidity, solvency, and growth indicators do not display similar effects in the pooled models.

This pattern suggests that the observed relationships mainly capture differences across institutions rather than persistent structural influences within individual PACS. This distinction provides the basis for the subsequent panel analysis. The panel models examine whether these associations remain significant after controlling for institution-specific heterogeneity over time.

6.7 Panel Regression Analysis of Profitability Determinants

In continuation to the pooled OLS analyses, panel regression models were estimated using GLOSP dimension indices. ROWC and NPM were again considered as the two independent variables. Model selection was determined using Hausman tests, and diagnostic statistics were computed to assess estimator validity. The results are presented in Tables 6.6–6.10.

6.7.1 Panel Fixed Effects Estimates—Net Profit Margin

Table 6.6 Fixed Effects Panel Regression Results (Dependent Variable: NPM)

Variable	Coefficient	Std. Error	t-value	p-value	Significance
Intercept	1.652	4.719	0.350	0.728	—
Growth Index (GIndex)	1.441	6.685	0.216	0.830	—
Liquidity Index (LIndex)	2.166	5.970	0.363	0.718	—
Operational Efficiency (OIndex)	0.045	6.491	0.007	0.994	—
Solvency Index (SIndex)	−5.409	7.311	−0.740	0.464	—

Model Diagnostics

Statistic	Value
R^2 (within)	0.022
F-statistic	0.787
Prob(F)	0.540
Observations	144
Number of PACS	36
Effects	Entity Fixed Effects

Source: CAMIS database.

Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

Even though coefficient signs provide directional tendencies, panel fixed effects estimate no considerable significance to any dimension index on NPM. The

results indicate that institutional profitability is shaped by a complex interaction of financial conditions rather than by isolated indicators.

6.7.2 Model Selection Test — NPM

Table 6.7 Hausman Specification Test (NPM Model)

Test	Chi-square	df	p-value	Decision
Hausman Test	10.778	4	0.029	Fixed Effects Preferred

Source: CAMIS database.

The Hausman test statistic ($p < 0.05$), supports the fixed-effects specification as the appropriate estimator. Accordingly, subsequent interpretation is based on fixed-effects results.

6.7.3 Fixed Effects Estimates — Return on Working Capital

Table 6.8 Fixed Effects Panel Regression Results (Dependent Variable: ROWC)

Variable	Coefficient	Std. Error	t-value	p-value	Significance
Intercept	−0.139	0.044	−3.14	0.002	***
Growth Index (GIndex)	−0.015	0.060	−0.25	0.803	—
Liquidity Index (LIndex)	0.084	0.063	1.33	0.186	—
Operational Efficiency (OIndex)	−0.013	0.061	−0.21	0.833	—
Solvency Index (SIndex)	−0.046	0.068	−0.68	0.498	—

Model Diagnostics

Statistic	Value
R^2 (within)	0.018
F-statistic	0.646
Prob(F)	0.631
Observations	144
Number of PACS	36
Effects	Entity Fixed Effects

Source: CAMIS database.

Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

Similar to NPM results, none of the GLOSP dimension index has significant relationship with ROWC. As in the case of NPM, here also coefficient values suggest

directional signs, but with no statistical support. These results highlight that, profitability differences of PACS are because of institution specific reasons, and profitability does not depend on any single factor.

6.7.4 Model Selection Test — ROWC

Table 6.9 Hausman Specification Test (ROWC Model)

Test	Chi-square	df	p-value	Decision
Hausman Test	14.619	4	0.0056	Fixed Effects Preferred

Source: CAMIS database.

The Hausman test again confirms that the fixed-effects model is preferred. This finding is a clear indication to the presence of institution-specific unobserved heterogeneity that influence the profitability outcomes of PACS.

6.7.5 Panel Model Diagnostics

Table 6.10 Diagnostic Tests for Panel Regression Models

Test	Statistic	Decision Rule	Result
Max VIF	**1.125**	< 10	No multicollinearity
Breusch–Pagan (ROWC)	$\chi^2 = 41.15$, $p < 0.001$	$p > 0.05$	Heteroskedasticity present
Breusch–Pagan (NPM)	$\chi^2 = 39.17$, $p < 0.001$	$p > 0.05$	Heteroskedasticity present
Jarque–Bera (ROWC)	JB = 365.77, $p < 0.001$	$p > 0.05$	Residuals non-normal
Jarque–Bera (NPM)	JB = 386.34, $p < 0.001$	$p > 0.05$	Residuals non-normal

Source: CAMIS database.

Diagnostic statistics indicate that no multicollinearity among explanatory variables. However, tests detect heteroskedasticity and deviations from residual normality. Such features are commonly observed in financial panel datasets. Although these conditions do not bias the coefficient estimates, they affect the reliability of standard errors. Therefore, heteroskedasticity-robust standard errors are employed to ensure reliable statistical inference.

6.7.6 Synthesis of Panel Regression Evidence

Taken together, the panel estimates do not find any individual performance dimension is independently associated with profitability outcomes across PACS. The results indicate that profitability is the outcome of the combined interaction of multiple financial conditions, and institution-specific factors. This finding supports the theoretical premise of the GLOSP framework that cooperative performance is inherently multidimensional and cannot be adequately explained through single-indicator models.

Table 6.11 Comparative Evidence on Financial Dimensions Across Pooled and Panel Models

Financial Dimension	Pooled OLS	Fixed Effects Panel	Random Effects Panel	Overall Analytical Pattern
Growth (GIndex)	→	–	–	Weak directional tendency only
Liquidity (LIndex)	→	–	–	No systematic evidence
Operational Efficiency (OIndex)	✓	–	–	Cross-sectional association only
Solvency (SIndex)	→	–	–	No consistent relationship
Multidimensional Interaction	—	—	—	Profitability reflects combined structural conditions

Source: Compiled from regression results reported in Tables 6.4–6.10.

Note: ✓ = statistically significant ($p < 0.05$); → = directional tendency (consistent sign but not significant);

– = no statistical or directional evidence; — = not applicable (summary row)

Table 6.11 summarises the results of pooled OLS and panel models. Operational efficiency is the only financial dimension found significant in cross-sectional models. Pooled OLS estimates also showed the directional tendency sign to growth, liquidity, and solvency dimensions. However, panel estimates could not find any dimension with significance. Overall, the results reveal no dimension exerting independent explanatory power within institutions over time. It means that

profitability outcomes reflect the interaction of multiple financial conditions rather than isolated structural factors.

6.8 Indicator-Level Binary Choice Models (Logit & Probit)

In this section, binary response models are estimated using logit and probit specifications to examine the determinants of profitability status among PACS. These models assess how financial performance dimensions influence the probability of a PACS being profit-making. Table 6.12 presents the logit estimates.

Table 6.12: Logit Estimates (Profitability Status)

Variable	Logit Coefficient	Logit Std. Error	Logit z-stat	Probit Coefficient	Probit Std. Error	Probit z-stat
Constant	43.564***	10.372	4.200	23.670***	4.974	4.759
Cash Ratio (CR)	3.578*	1.983	1.805	2.092*	1.126	1.857
Working Capital Ratio (WCR)	−38.936***	9.664	−4.029	−21.186***	4.746	−4.464
Operating Efficiency (OE)	−8.268	19.320	−0.428	−5.465	10.555	−0.518
Operating Cost Ratio (OCR)	−26.004***	7.980	−3.259	−14.416***	4.081	−3.533
Capital Adequacy Proxy (CAP)	−40.817	58.587	−0.697	−18.880	31.980	−0.590
Deposit Growth (%)	3.463***	1.087	3.186	1.863***	0.556	3.352
Loan Growth (%)	0.721	3.050	0.237	0.283	1.704	0.166

Source: CAMIS database.
Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

The results indicate a high degree of consistency across logit and probit specifications. As per this, working capital adequacy and operating cost efficiency are the most robust predictors of profitability status. It suggests the likelihood of a PACS being profit-making with higher working capital ratios and lower operating costs.

Deposit growth also has a positive and statistically significant association with profitability probability. However, operating efficiency, capital adequacy, and loan growth do not show consistent effects.

6.9 Index-Level Binary Choice Models (GLOSP Dimensions)

In continuation of logit estimates, probit estimates are also undertaken to identify the financial dimensions that influence the likelihood of a PACS being profit-making. Table 6.13 presents the probit estimates.

Table 6.13 Probit Estimates (Profitability Status)

Variable	Coefficient	Std. Error	z-value	p-value	Significance
Constant	0.880	0.503	1.75	0.080	
Growth Index (GIndex)	4.701	2.600	1.81	0.071	*
Liquidity Index (LIndex)	**6.032**	3.077	1.96	0.050	**
Operational Efficiency Index (OIndex)	-0.462	1.118	-0.41	0.680	—
Solvency Index (SIndex)	1.858	1.303	1.43	0.154	—

Model Diagnostics

Statistic	Value
Log-Likelihood	-14.94
LR χ^2 (4)	16.15
Prob > χ^2	**0.0031**
Pseudo R^2 (McFadden)	0.348
Correct Classification (indicative)	High
Convergence	Yes

Source: CAMIS database.
Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

The result indicates that liquidity-related dimensions remain the most consistent predictors of profitability classification. Deposit growth also has a positive and significant association with profitability status. But operating efficiency, capital adequacy, and loan growth do not have any consistent effects. Overall, index-level specification and indicator-level models confirm similar directional patterns.

Table 6.14 presents the alternative binary specification.

Table 6.14 Binary Model (Alternative Specification)

Variable	Coefficient	Std. Error	z-value	p-value	Significance
Constant	0.484	0.276	1.75	0.080	
Growth Index (GIndex)	2.723	1.470	1.85	0.064	*
Liquidity Index (LIndex)	**3.454**	1.650	2.09	0.036	**
Operational Efficiency Index (OIndex)	-0.230	0.631	-0.36	0.716	—
Solvency Index (SIndex)	1.051	0.732	1.44	0.151	—

Model Diagnostics

Statistic	Value
Log-Likelihood	-15.007
LR χ^2 (4)	15.82
Prob > χ^2	**0.0033**
Pseudo R^2 (McFadden)	0.345
Convergence	Yes

Source: CAMIS database. Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

Table 6.14 results are consistent with the primary model, confirming the robustness of working capital management, cost control, and deposit mobilisation in shaping profitability outcomes. The stability of findings across specifications reinforces the reliability of the identified determinants of profitability status.

6.10 Marginal Effects from Logistic Regression

To facilitate interpretation of the binary response models, marginal effects are estimated to quantify the change in the probability of a PACS being profit-making associated with changes in key financial dimensions.

Table 6.15 Marginal Effects (Profitability Status)

Variable	Marginal Effect (dy/dx)	Std. Error	z-value	p-value	Significance
Growth Index (GIndex)	0.633	0.379	1.67	0.095	*
Liquidity Index (LIndex)	**0.812**	0.313	2.60	0.009	***
Operational Efficiency Index (OIndex)	-0.062	0.156	-0.40	0.690	—
Solvency Index (SIndex)	0.250	0.157	1.59	0.111	—

Source: CAMIS database.

Note: *, **, *** denote significance at 10%, 5% and 1% levels respectively for explanatory variables.

The marginal effects indicate that improvements in working capital adequacy and reductions in operating costs substantially increase the probability of a PACS being profit-making. Deposit growth also contributes positively, though with a relatively smaller marginal impact. Other dimensions do not exhibit economically meaningful probability effects, suggesting a limited role in determining profitability status.

To visualise these dynamic patterns, partial effect plots are examined in the following section.

6.11 Partial Effect Plots Illustrating Performance–Profitability Dynamics

Partial effect plots are employed to visualise the marginal influence of key financial dimensions on the probability of a PACS being profit-making, holding other factors constant.

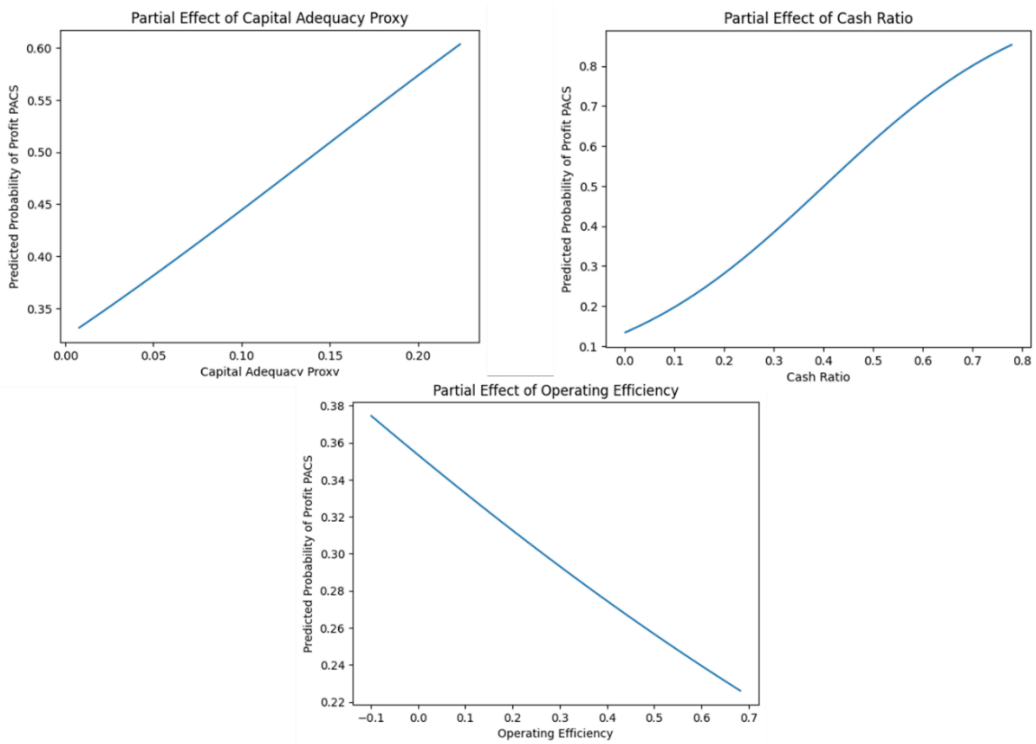

Chart 6.2 Partial Effects on Profitability Probability

The partial effect plots indicate that the probability of a PACS being profit-making is related to the improvements in working capital adequacy and reductions in operating costs. Deposit growth also has positive marginal influence on profitability. However, other dimensions have limited influences.

6.12 Integrated Synthesis of Profitability Determinants

This section integrates the results from descriptive comparisons, regression models, binary specifications, marginal effects, and partial effect plots. Overall synthesis reveals that profitability performance of PACS is not depended on any single financial metric, but it is the outcome of the interacting performance dynamics across growth, liquidity, operational efficiency, and solvency dimensions. The integrated synthesis understands that, the structural conditions and performance behaviour jointly shape the performance dynamics of PACS.

The cross-sectional pooled OLS models establish that operational efficiency is the only dominant long-term determinant of profitability levels. This indicate that PACS with lower operating costs and better expense management achieve consistently higher profitability. Even though, growth, liquidity, and solvency are economically relevant, they do not independently explain variations in profitability

magnitude. These finding highlights that structural cost discipline differentiates persistently profitable PACS from chronically loss-making ones. However, panel regression results refine this insight.

The panel regression results demonstrate that, once institution-specific heterogeneity is controlled, no individual dimension independently explains profitability variation. As per this finding, within-institution profitability dynamics are governed by interacting financial conditions rather than dominant single predictors.

Further, the binary response models shift the focus from profitability magnitude to profitability status. It assessed the probability of a PACS being profit-making rather than loss-making. The logistic and probit models consistently identify liquidity strength as the most decisive determinant of profitability of PACS. As per this, growth has a weaker but supportive role. Once liquidity is considered, operational efficiency and solvency do not independently determine the binary outcome. This distinction necessitates the analytical importance of separating profitability levels from profitability thresholds.

The marginal effects estimate and partial effect plots also provide a visual synthesis of these relationships. The marginal effects estimate shows that improvements in working capital adequacy and reductions in operating costs substantially increase the probability of a PACS being profit-making. Even though the marginal impact is relatively smaller, deposit growth also contributes positively. Other dimensions have only a limited role in determining profitability status, as they do not exhibit economically meaningful probability effects.

Together, liquidity emerges as the strongest probabilistic discriminator of profitability status, operational efficiency determines how profitable it can be, and capital adequacy underpins financial resilience. Growth supports profitability prospects of PACS if there is adequate liquidity and efficient operations.

Overall, the findings demonstrate that profitability in cooperative credit institutions is shaped by interacting liquidity, efficiency, solvency, and growth dynamics rather than by any single financial dimension. This multidimensional evidence strongly validates the analytical relevance of the GLOSP framework and

provides a robust empirical foundation for the composite index construction and performance evaluation.

6.13 Discussion

The previous section analysed the financial determinants of profitability outcomes within the broader framework of performance dynamics among PACS using pooled, panel, and binary modelling approaches. The discussion is presented in two complementary layers - The first layer interprets the empirical results within the analytical framework of the GLOSP model, and the second layer translates these findings into practical dimensions of PACS functioning.

6.13.1 Analytical Interpretation Based on Econometric Evidence

As per the empirical analysis, profitability among PACS is determined by multiple financial dimensions whose influence varies across analytical contexts. However, the pooled cross-sectional regression results indicate that the inter-societal profitability differences are explained more by operational efficiency and also by selected growth-related indicators. Together, the structural characteristics such as cost discipline, productivity, and scale of operations have influences in determining the profitability of PACS. Similar findings have been reported in banking literature in 1997 and 2003. (Berger & Humphrey, 1997; Berger & Mester, 2003). These studies signify the dominant roles of efficiency and scale advantages to the long-run profitability differentials across banking institutions.

However, when unobserved PACS-specific heterogeneity is controlled through fixed effects panel estimation, liquidity and solvency emerge as more influential determinants of within-PACS profitability variation over time. This distinction reflects the fundamental difference between pooled and panel estimation frameworks. While pooled models capture between-entity variation, fixed effects models isolate within-entity dynamics by removing time-invariant structural characteristics (Hsiao, 2014; Wooldridge, 2010). The stronger role of liquidity in panel models therefore indicates that short-term financial management plays an important role in shaping annual profitability outcomes. Liquidity shows a strong influence on profitability, as it directly affects working capital cycles, credit flow continuity, and operational stability. Some earlier studies also have pointed out that

liquidity management constitutes a key determinant of short-term financial performance in cooperative and banking institutions (Bourke, 1989; Molyneux & Thornton, 1992).

Models based on net profit margins exhibit a comparatively gradual but statistically meaningful relationship between solvency indicators and profitability. This shows the long-term influence of capital structure and leverage on profitability. Some studies on banks also pointed out that solvency acts as a stabilising dimension that enhances resilience, while short-term returns are constrained during adjustment phases (Goddard, Molyneux, & Wilson, 2004).

The binary response models indicate that liquidity and solvency significantly affect the probability of a PACS being profit-making. Marginal effects estimate further show that improvements in liquidity and solvency dimensions increase the likelihood of positive profitability outcomes. This highlights their threshold effects rather than linear relationships. Some earlier literature also has noted balance-sheet strength and liquidity buffers as critical predictors of institutional viability (Altman, 1968; Beaver, 1966).

Taken together, the econometric evidence confirms that performance outcomes of PACS arise from the interaction of structural efficiency, short-term liquidity management, and long-term solvency discipline. It does not support the view that the profitability of PACS is attributable to a single financial indicator. This suggests that sustainable profitability can be attained through simultaneous improvement across dimensions rather than isolated reform. In short, the differentiated behaviour of various dimensions across pooled, panel, and binary models validates the multidimensional logic underlying the GLOSP framework.

6.13.2 Practical Interpretation in the Context of PACS Functioning

The empirical findings get relevance only when interpreted within the institutional context of PACS. PACS operates at the grassroots level, under unique governance structures and socio-economic obligations that shape their financial behaviour (NABARD, 2021; RBI, 2022). Therefore, the determinants identified through the GLOSP framework are not isolated financial outcomes, but they reflect the underlying institutional processes.

Studies have pointed out that structural inefficiencies such as high establishment costs, low staff productivity, and reliance on manual systems contribute to persistent operating expenses and recurring losses in many societies (Government of India, 2022; NABARD, 2021). Thus, operational efficiency becomes a critical factor influencing the profitability of PACS. Since these inefficiencies are embedded in organisational practices, long-term strategic approaches are necessary to make changes in them. These inefficiencies cannot be easily corrected through short-term financial assistance.

Liquidity management also plays an important role in determining the performance of PACS. Many official studies have found that weak recovery performance intensifies liquidity stress among PACS (RBI, 2021; NABARD, 2022). Effective working capital management, especially the recovery management, is therefore essential for maintaining liquidity and thereby maintaining member confidence.

Solvency is the long-term financial resilience of PACS. PACS with adequate capital buffers and prudent leverage withstand adverse shocks and maintain financial stability, even when short-term profitability fluctuates (RBI, 2022). Even though growth indicators show limited independent influence on profitability, it also requires much attention. Growth in membership, deposits, or lending can increase financial risk if there are problems in managerial efficiency and liquidity discipline (Government of India, 2022).

Overall, the findings indicate that PACS performance depends on the combined influence of operational efficiency, liquidity stability, and solvency strength. These dimensions also reflect variations in managerial capability and governance quality across societies (NABARD, 2021; RBI, 2021). The GLOSP framework captures these interdependencies and provides a multidimensional perspective for understanding PACS performance and guiding policy interventions.

6.14 Summary of Analysis

The chapter examined the financial determinants of profitability among PACS using cross-sectional pooled regression, panel data models, and binary response specifications. The evidence indicates that profitability outcomes are shaped by a

combination of structural and dynamic financial dimensions. Liquidity and solvency emerge as relatively more consistent determinants across model frameworks. The panel analysis highlights the presence of institution-specific heterogeneity and reinforces the importance of internal governance and financial discipline. Collectively, the findings provide a multidimensional analytical foundation for the composite performance framework developed in the subsequent chapter.

Taken together, the analytical evidence indicates that profitability variation among PACS cannot be attributed to any single financial dimension operating independently. This pattern confirms that cooperative performance is structurally multidimensional rather than reducible to isolated predictors.

Chapter 7

CONSTRUCTION AND APPLICATION OF THE GLOSP COMPOSITE PERFORMANCE INDEX FOR PACS IN KERALA

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CHAPTER VII

CONSTRUCTION AND APPLICATION OF THE GLOSP COMPOSITE PERFORMANCE INDEX FOR PACS IN KERALA

7.1 Introduction

This chapter develops and applies a composite performance index – *GLOSP performance evaluation framework* or *GLOSP Model* - based on the structural examination and the econometric assessment of profitability determinants discussed in earlier chapters. While the earlier chapters examined individual financial dimensions and their associations with profitability, the present chapter integrates these dimensions into a unified evaluative structure. This shifts the focus from isolated indicators to a consolidated representation of institutional performance.

The composite framework operationalises the GLOSP model by combining standardised financial indicators relating to growth, liquidity, operational efficiency, and solvency. Each dimension is identified in the cooperative finance literature as central to organisational sustainability (NABARD, 2021; RBI, 2022). By aggregating these multidimensional indicators into a composite index, the framework provides a systematic method for comparing the performance dynamics of PACS.

The composite framework is subsequently applied to classify PACS across performance categories and to examine their positioning in relation to profitability status. This enables examination of how multidimensional institutional strength corresponds with observed profitability status of PACS. However, the analysis remains diagnostic and comparative in nature. The objective is to assess structural consistency between composite performance and financial outcomes; and does not aim to establish causal relationships.

7.2 The Z-Score Panel *(Annexure V)*

To ensure comparability across the variables measured in different units and scales, standardisation was carried out using Z-score transformation. This allows heterogeneous financial indicators to be meaningfully aggregated across dimensions.

During the standardisation process, necessary directional adjustments were applied to indicators such as OCR, where higher values indicate weaker performance.

This was done to ensure that all transformed variables follow a consistent interpretation. After transformation, higher Z-scores uniformly represent stronger financial performance across all dimensions.

Profitability indicators were deliberately excluded from the standardisation process. The objective of the composite index is to evaluate the underlying financial structure of PACS rather than reproduce profitability outcomes. The resulting Z-score panel therefore serves as the analytical base for constructing the dimension-wise indices and the composite GLOSP index presented in the subsequent sections.

7.2.1 Z -score Standardisation

The standardisation and directional adjustment procedure applied to GLOSP indicators is presented in Table 7.1.

Table 7.1 Z-Score Standardisation and Directional Adjustment of GLOSP Indicators

GLOSP Dimension	Indicator Type	Standardisation Method	Directional Adjustment	Interpretative Meaning After Adjustment
Growth	Growth rates of deposits, loans, business volume	Z-score standardisation	No inversion required	Higher standardised value indicates stronger growth performance
Liquidity	Cash ratio, deposit–loan coverage, current liquidity measures	Z-score standardisation	Direction aligned positively	Higher value reflects stronger liquidity position
Operational Efficiency	Cost ratios, expense–income ratios	Z-score standardisation	**Inverted (sign reversed)**	Higher value reflects greater operational efficiency (lower costs)
Solvency	Debt–equity ratio, fixed asset ratio, leverage indicators	Z-score standardisation	**Inverted where necessary**	Higher value reflects stronger solvency and financial stability

After building the standardised indicator values presented in the Z-score panel, the following section aggregates these Z-scores into dimension-wise indices corresponding to Growth, Liquidity, Operational Efficiency, and Solvency.

7.3 Dimension-wise indices (GIndex, LIndex, OIndex, SIndex)

As a next step, dimension-wise performance indices were computed for Growth (GIndex), Liquidity (LIndex), Operational Efficiency (OIndex), and Solvency (SIndex) based on the standardised indicator panel. These indices represent aggregated dimension-level performance scores derived from the corresponding financial indicators within each GLOSP component.

The year 2020–21 is excluded from the index construction and subsequent analysis as it represents an abnormal shock period due to the COVID-19 pandemic. This is done to ensure standardisation and comparability across PACS.

Table 7.2 Dimension-wise Indices (GIndex, LIndex, OIndex, SIndex)

PACS Code	GIndex	LIndex	OIndex	SIndex
101	-0.1857	-0.0768	-0.2183	-0.0819
102	-0.3917	-0.4024	0.7205	1.2952
103	0.0392	-0.3930	-0.0057	0.7713
104	1.0263	1.1896	-0.3141	0.2218
105	-0.0608	0.0881	-0.0684	0.7324
106	-0.1651	-0.1375	0.5793	-0.3676
107	0.4620	0.1113	1.4615	-0.0362
108	0.0280	0.1204	-0.3361	0.8518
109	-0.5183	-0.0796	0.4580	0.4276
110	-0.0694	-0.1005	-0.3570	0.6994
111	-0.1978	-0.2053	-0.3592	-0.1239
112	-0.2132	0.0548	-0.2941	-0.1587
113	0.0135	-0.2951	-0.3140	0.5682
114	-0.2697	-0.2255	0.2953	0.4083
115	-0.1397	0.1513	0.1817	-0.0499
116	-0.1055	-0.3174	0.8969	0.8653
117	0.2929	-0.1118	0.6176	-0.2627
118	0.0976	-0.1291	-0.2679	0.1142
119	-0.2982	-0.0461	0.1084	0.1645
120	0.1613	0.0727	-0.3329	0.0563

PACS Code	GIndex	LIndex	OIndex	SIndex
121	-0.2136	-0.2474	0.8781	0.2907
122	-0.2021	0.7593	0.2816	-0.6046
123	-0.0902	-0.2177	0.3274	0.1308
201	0.0568	0.1661	-0.3189	-0.2590
202	-0.0036	0.1314	-0.2886	-0.1840
203	0.3546	0.0257	-0.4705	-0.5975
204	0.0559	0.3879	-0.3126	-0.6348
205	0.0434	0.1127	-0.2653	-0.6035
206	0.0587	0.9414	-0.3246	-0.2683
207	0.9168	0.1486	-0.3750	-0.5585
208	0.0776	-0.0699	-0.2594	-0.4038
209	0.0496	0.0346	-0.1866	-0.4098
210	-0.1155	0.6132	-0.4329	-0.4418
211	0.1388	0.3594	-0.4051	-0.4638
212	-0.1085	0.0233	-0.0025	1.4657
213	0.4458	0.9272	-0.1765	-0.0816

Source: Computed by the researcher using standardised indicator values reported in Annexure V.

Table 7.2 reveals heterogeneous performance patterns across PACS. Dimension wise index values show wide variations both at individual PACS level, and at inter-PACS comparisons. Index values dominating in one PACS may be weaker at another. Uniform dominance is not demonstrated by any index. All index values have strength in one or other PACS and the same index shows weakness in other PACS. This reveals the multidimensional nature of PACS' performance. These variations justify the construction of GLOSP composite index which can synthesise dimension-level differences into a consolidated performance measure.

7.4 Construction of the GLOSP Composite Index

Table 7.3 shows the Composite GLOSP Index values of the sample PACS. This composite index is constructed by aggregating the four dimension-wise indices—GIndex, LIndex, OIndex, and SIndex—reported in Table 7.2. Thus, Composite GLOSP Index provides a single summary measure of all indices. This score represents the performance strength of each PACS in a comparable manner.

Due to the absence of established theoretical or empirical consensus on differential weighting of PACS performance dimensions, equal weighting was adopted to maintain

transparency and to avoid subjective bias in aggregation. Sensitivity checks confirmed that the substantive ranking pattern remains stable under alternative weighting assumptions.

Table 7.3 Composite GLOSP Index of Sample PACS

PACS Code	Composite GLOSP Index
101	-0.1407
102	0.3054
103	0.1029
104	0.5309
105	0.1728
106	-0.0227
107	0.4996
108	0.1660
109	0.0719
110	0.0431
111	-0.2215
112	-0.1528
113	-0.0068
114	0.0521
115	0.0359
116	0.3348
117	0.1340
118	-0.0463
119	-0.0179
120	-0.0107
121	0.1770
122	0.0585
123	0.0376
201	-0.0888
202	-0.0862
203	-0.1719
204	-0.1259
205	-0.1782
206	0.1018
207	0.0330
208	-0.1639
209	-0.1280
210	-0.0943
211	-0.0927
212	0.3445
213	0.2787

Source: Computed by the researcher using dimension-wise GLOSP indices reported in Table 7.2.

The Composite GLOSP Index scores of each PACS reveals substantial variation in overall performance across sample PACS. Positive index values indicate above-average performance, and negative values reflect performance below the sample mean. The differences in scores indicate variations in the financial and operational conditions of individual societies.

The composite scores show that some PACS record consistently higher composite scores, and some have lower values. PACS with good balanced performance across growth, liquidity, operational efficiency, and solvency dimensions show better scores. On the other side, lower composite scores reflect weaknesses in one or more of these dimensions. This pattern suggests that performance of PACS is determined by the combined interaction of multiple performance dimensions. Therefore, the composite index provides a comprehensive benchmark for evaluating the institutional strength across PACS. It also forms the analytical basis for the ranking and classification of societies presented in the subsequent sections.

7.5 Ranking and Classification

Based on the composite scores identified in Table 7.3, the ranking and classification of PACS is given in Table 7.4. PACS are presented in the table in descending order of composite score to get the comparative results easily. Moreover, PACS are also grouped into three performance categories - such as high, moderate, and low - based on multidimensional performance scores. Ranking values also given to all sample PACS to ensure easy comparison.

Table 7.4: Ranking and Classification of PACS Based on Composite GLOSP Index

Sl No.	PACS Code	Composite GLOSP Index	Rank	Performance Category
1	104	0.5309	1	High Performing
2	107	0.4996	2	High Performing
3	212	0.3445	3	High Performing
4	116	0.3348	4	High Performing
5	102	0.3054	5	High Performing
6	213	0.2787	6	High Performing
7	121	0.1770	7	High Performing
8	105	0.1728	8	High Performing
9	108	0.1660	9	High Performing
10	117	0.1340	10	High Performing

Sl No.	PACS Code	Composite GLOSP Index	Rank	Performance Category
11	103	0.1029	11	High Performing
12	206	0.1018	12	High Performing
13	109	0.0719	13	Average Performing
14	122	0.0585	14	Average Performing
15	114	0.0521	15	Average Performing
16	110	0.0431	16	Average Performing
17	123	0.0376	17	Average Performing
18	115	0.0359	18	Average Performing
19	207	0.0330	19	Average Performing
20	113	-0.0068	20	Average Performing
21	120	-0.0107	21	Average Performing
22	119	-0.0179	22	Average Performing
23	106	-0.0227	23	Average Performing
24	118	-0.0463	24	Average Performing
25	202	-0.0862	25	Low Performing
26	201	-0.0888	26	Low Performing
27	211	-0.0927	27	Low Performing
28	210	-0.0943	28	Low Performing
29	204	-0.1259	29	Low Performing
30	209	-0.1280	30	Low Performing
31	101	-0.1407	31	Low Performing
32	112	-0.1528	32	Low Performing
33	208	-0.1639	33	Low Performing
34	203	-0.1719	34	Low Performing
35	205	-0.1782	35	Low Performing
36	111	-0.2215	36	Low Performing

Source: Computed by the researcher using Composite GLOSP Index values reported in Table 7.3.

The rankings and composite score-based performance categories of each PACS presented in Table 7.4 reveal considerable variations in the overall performance of sample PACS. Societies with higher composite GLOSP scores suggest that these PACS consistently display stronger multidimensional performance across growth, liquidity, operational efficiency, and solvency dimensions. Their higher positions in the ranking therefore reflect comparatively better-balanced financial strength across the key components of institutional performance.

In contrast, PACS placed in the lower ranks have weaker composite scores, and this shows the deficiencies in the performance of one or more financial dimensions. This indicates poor or uneven institutional capacity. The results also suggest that performance of these PACS across the sector is not uniform. Overall, the

results show that only a limited number of societies demonstrate balanced strength across all dimensions.

The ranking as well as the composite scores thus provides a useful benchmarking reference for comparing institutional performance. It helps the apex bodies and government in identifying PACS that may require targeted policy attention and institutional strengthening.

7.6 Stability and Consistency of GLOSP Rankings over Time

The stability and consistency of GLOSP rankings of the sample PACS are also examined. The results are shown in Table 7.5. The table is constructed using the year-wise Composite GLOSP Index rankings and therefore gives a quick understanding about the persistence or volatility of each PACS over the study period. For the purpose, the table summarises the average rank, the variability of ranks, and the best and worst positions attained by each PACS during the study period. Societies with relatively stable rankings indicate consistent multidimensional performance, and societies with larger variations suggest fluctuations in financial conditions across years.

Table 7.5: Stability and Consistency of GLOSP Rankings over Time

PACS Code	Avg Rank	Rank SD	Best Rank	Worst Rank	Stability Category
101	29.75	2.8723	26	33	Low Stability
102	5	1.8257	3	7	Moderately Stable
103	10.5	3.4157	6	14	Low Stability
104	3	2.4495	1	6	Low Stability
105	7.5	3.5119	4	11	Low Stability
106	20.25	5.7373	13	27	Low Stability
107	2.5	0.5774	2	3	Highly Stable
108	8.5	2.8868	5	12	Low Stability
109	13.75	5.5000	9	21	Low Stability
110	15.5	4.5092	9	19	Low Stability
111	34.75	1.2583	33	36	Moderately Stable
112	30.75	3.9476	26	34	Low Stability
113	17.75	4.9917	14	25	Low Stability

PACS Code	Avg Rank	Rank SD	Best Rank	Worst Rank	Stability Category
114	15.25	4.1932	11	21	Low Stability
115	15	6.0553	7	21	Low Stability
116	6.25	3.7749	2	11	Low Stability
117	15.75	10.6888	3	26	Low Stability
118	22.25	4.5000	16	26	Low Stability
119	19.25	2.5000	16	22	Low Stability
120	18	4.1633	13	23	Low Stability
121	8.5	3.3166	5	13	Low Stability
122	14.75	3.4034	12	19	Low Stability
123	16.5	9.0370	6	28	Low Stability
201	24.75	6.0759	18	32	Low Stability
202	25	2.1602	23	28	Low Stability
203	30	11.3431	13	36	Low Stability
204	27.25	7.8475	17	36	Low Stability
205	32.25	1.5000	31	34	Moderately Stable
206	11.75	5.5603	8	20	Low Stability
207	21	14.5373	1	34	Low Stability
208	32.75	1.5000	32	35	Moderately Stable
209	29	2.7080	25	31	Low Stability
210	25.5	3.0000	22	28	Low Stability
211	25.75	2.7538	23	29	Low Stability
212	22.25	14.6828	1	33	Low Stability
213	7.75	7.1356	2	18	Low Stability

Source: Computed by the researcher using year-wise Composite GLOSP Index values derived from dimension-wise indices.

The results presented in Table 7.5 show the stability of rank positions of PACS over the study period. Many PACS have low stability in rankings and show wide variations in rank positions across years. These variations and fluctuations reflect the variations in financial conditions and management practices of PACS. This also reveals the presence of institutional heterogeneity within the sector. Such stability variations of PACS emphasise that performance evaluation should consider not only rank position but also the stability of that position over time.

On the other side, some PACS maintain relatively stable ranking positions across the study years. This indicates sustained institutional performance over time. It also reveals consistent functioning across the key financial dimensions captured in the GLOSP framework.

The combined evaluation of tables 7.4 and 7.5 provide a more comprehensive picture of PACS performance. Table 7.4 showed the relative position of societies based on their Composite GLOSP Index, and Table 7.5, examined whether these positions remain consistent across years. The combined evidence shows that several high-ranked PACS maintain comparatively stable rankings also. This indicates sustained multidimensional strength and institutional resilience.

At the same time, PACS with moderate or lower ranks show greater variability in their positions over the years. These variations suggest unstable financial performance and weak institutional conditions. The joint interpretation of the two tables therefore strongly suggests that effective performance evaluation of PACS should consider both current rank and temporal stability. High ranking without stability, or higher stability with lower ranks, may require different forms of policy and managerial intervention.

7.7 Joint GLOSP–Profitability Quadrant Classification

Table 7.6 presents the results of a joint assessment of PACS performance by combining the Composite GLOSP Index with profitability outcomes. For the purpose, the PACS are classified into four quadrants based on their relative GLOSP performance and Profit status. This quadrant-based framework enables simultaneous evaluation of PACS on the basis of structural financial strength and observed profitability. It helps to identify whether PACS with strong institutional structure is consistently associated with positive financial outcomes. The classification thus serves as an empirical consistency check for the GLOSP framework.

Table 7.6: Joint GLOSP–Profitability Quadrant Classification of Sample PACS

PACS Code	Composite GLOSP Index	NPM	Profit Status	Quadrant
101	-0.1407	-2.3989	Loss	Low GLOSP – Low Profit
102	0.3054	-16.9850	Loss	High GLOSP – Low Profit
103	0.1029	-2.7744	Loss	High GLOSP – Low Profit
104	0.5309	-1.1206	Loss	High GLOSP – Low Profit

PACS Code	Composite GLOSP Index	NPM	Profit Status	Quadrant
105	0.1728	-0.8275	Loss	High GLOSP – Low Profit
106	-0.0227	-5.7642	Loss	Low GLOSP – Low Profit
107	0.4996	-1.0917	Loss	High GLOSP – Low Profit
108	0.1660	-0.5746	Loss	High GLOSP – Low Profit
109	0.0719	-8.6224	Loss	High GLOSP – Low Profit
110	0.0431	-1.3525	Loss	Low GLOSP – Low Profit
111	-0.2215	-3.5578	Loss	Low GLOSP – Low Profit
112	-0.1528	-0.6885	Loss	Low GLOSP – Low Profit
113	-0.0068	-0.6670	Loss	Low GLOSP – Low Profit
114	0.0521	-3.1600	Loss	High GLOSP – Low Profit
115	0.0359	-3.9687	Loss	Low GLOSP – Low Profit
116	0.3348	-1.1127	Loss	High GLOSP – Low Profit
117	0.1340	-7.0278	Loss	High GLOSP – Low Profit
118	-0.0463	-0.6110	Loss	Low GLOSP – Low Profit
119	-0.0179	-2.8085	Loss	Low GLOSP – Low Profit
120	-0.0107	-1.7698	Loss	Low GLOSP – Low Profit
121	0.1770	-1.5810	Loss	High GLOSP – Low Profit
122	0.0585	-0.3951	Loss	High GLOSP – Low Profit
123	0.0376	-6.1157	Loss	Low GLOSP – Low Profit
201	-0.0888	0.0661	Profit	Low GLOSP – High Profit
202	-0.0862	0.0278	Profit	Low GLOSP – High Profit
203	-0.1719	0.0152	Profit	Low GLOSP – High Profit
204	-0.1259	0.0151	Profit	Low GLOSP – High Profit
205	-0.1782	0.0291	Profit	Low GLOSP – High Profit
206	0.1018	0.0987	Profit	High GLOSP – High Profit
207	0.0330	0.0475	Profit	Low GLOSP – High Profit
208	-0.1639	0.0415	Profit	Low GLOSP – High Profit
209	-0.1280	0.0272	Profit	Low GLOSP – High Profit
210	-0.0943	0.0445	Profit	Low GLOSP – High Profit
211	-0.0927	0.0160	Profit	Low GLOSP – High Profit
212	0.3445	0.0571	Profit	High GLOSP – High Profit
213	0.2787	0.0262	Profit	High GLOSP – High Profit

Source: Computed by the researcher using Composite GLOSP Index values (Table 7.3) and average Net Profit Margin.

The quadrant classification table reveals the distinct performance patterns of sample PACS. PACS are classified here into four quadrants – such as *High GLOSP – High Profit, High GLOSP – Low Profit, Low GLOSP – High Profit, and Low GLOSP – Low Profit.* Societies inside the High GLOSP–High Profit quadrant have strong multidimensional performance score and sustainable profitability. Their position

indicates balanced strength across growth, liquidity, operational efficiency, and solvency.

PACS under High GLOSP–Low Profit quadrant has strong structural performance but weak profitability. The PACS belong to this requires careful attention. Here, the societies are unable to convert their multidimensional financial strength into surplus generation. Even though, these PACS have adequate liquidity, stable capital structure, and prudent leverage enhance institutional resilience and long-term sustainability, they fail in profit generation. Most probably, the loss may be due to any unexpected or short term financial and operational issues. Provisioning requirements, recovery delays, post-pandemic adjustments, temporary income fluctuations etc. may affect short term profitability. As a result, even structurally strong PACS may record weak profitability in certain periods. The presence of PACS in this quadrant therefore reinforces the relevance of the GLOSP framework.

PACS under Low GLOSP–High Profit quadrant display profitability despite weaker composite performance. Profitability of such PACS may be because of any temporary advantage or due to any non-structural factors.

Finally, the Low GLOSP–Low Profit quadrant identifies vulnerable societies with weak structural performance and poor profitability. These PACS require special attention from both management as well as apex bodies. Structural and policy refinements are required to these PACS, in addition to institutional strengthening.

Taken together, the quadrant analysis enhances the usefulness of the GLOSP index as a multidimensional framework for evaluating and differentiating PACS across the sector.

7.8 GLOSP—Profitability Quadrant Diagram

Chart 7.1 visualises the joint GLOSP–Profitability quadrant classification of sample PACS. For the purpose the sample is divided into four quadrants using the mean GLOSP value and the zero-profit threshold. The horizontal axis plots the Composite GLOSP Index and the vertical axis represents post-COVID Net Profit Margin. The chart complements the tabular classification presented in Table 7.6 and illustrates the relative position of each PACS in terms of both structural performance and profitability outcomes.

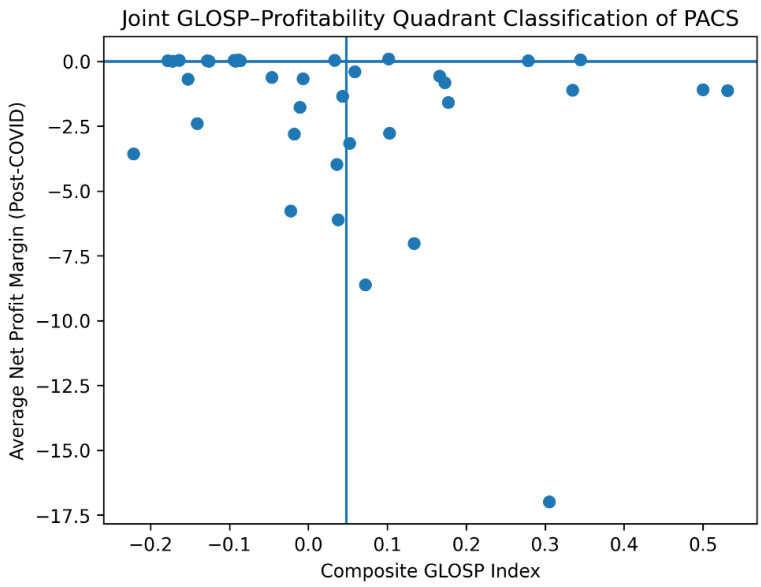

Chart 7.1: Joint GLOSP–Profitability Quadrant Classification of Sample PACS

The differences in institutional performance among the sampled PACS is clearly exhibited in the quadrant diagram. The *High GLOSP–High Profit* quadrant includes societies with strong multidimensional financial performance and sustainable profitability. The *High GLOSP–Low Profit* quadrant has PACS that show sound structural strength but weaker profitability. The societies belong to this quadrant may experience short-term operational constraints or temporary issues. These societies can perform well if they get special attention in dealing with the short-term constraints.

PACS positioned in the *Low GLOSP–High Profit* quadrant is structurally weak but show short term profitability because of some temporary non-structural factors. The temporary advantages of these PACS cannot be considered as the result of sustained institutional strength.

Finally, the *Low GLOSP–Low Profit* quadrant covers vulnerable societies with weak structural indices and poor profitability. These PACS represent priority cases and they need special urgent attention from policy makers and administrative authorities.

Overall, the chart visually reinforces the analytical value of the GLOSP framework by distinguishing PACS according to both structural performance capacity and realised financial outcomes.

7.9 Conceptual Joint GLOSP–Profitability Classification Framework

To visually validate the classification results, a quadrant representation is given in chart 7.2. This quadrant representation is titled as Conceptual Joint GLOSP–Profitability Classification Framework, and this presents a conceptual 2×2 quadrant model for the joint assessment of PACS based on Composite GLOSP performance and profitability status.

The horizontal axis of this framework represents the Composite GLOSP Index and the vertical axis represents profitability status. By combining these two dimensions, the chart provides a clear visual classification of societies into four distinct performance categories as in the case of quadrant diagramme.

This conceptual representation complements the empirical results presented in Table 7.6. It helps to explain how institutional strength interacts with profitability outcomes across PACS.

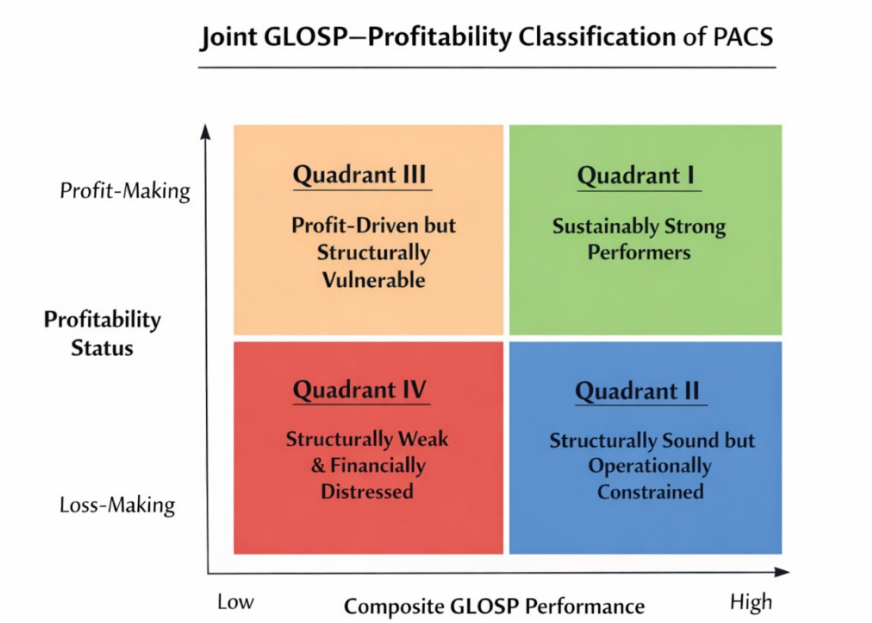

Chart 7.2: Conceptual Joint GLOSP–Profitability Classification Framework

Similar to quadrant diagramme chart 7.2 also has four distinct performance quadrants. Quadrant I includes sustainably strong performing societies having high GLOSP performance with profitability. These PACS are strong as well as profitable. Quadrant II consists of PACS with strong structural performance but weak

profitability. These societies have strong institutional foundations but they experience short-term operational or environmental constraints. affecting surplus generation.

PACS included in Quadrant III are profitable but still performing with weaker composite performance. These are structurally fragile and therefore, their profitability may be from any temporary advantages or due to some non-structural factors.

Quadrant IV PACS are structurally weak and financially distressed. These have lower composite score and very poor profitability. These societies experience structural weaknesses across key financial dimensions. Considering their weakness in all aspects, such require priority attention for institutional strengthening and policy support.

Overall, the above illustrations reinforce the usefulness of the GLOSP framework in distinguishing PACS not only by observed profitability but also by their underlying structural capacity.

7.10 Synthesis of Joint GLOSP–Profitability Assessment

The joint analysis of the Composite GLOSP Index and profitability outcomes provides valuable information on the multidimensional structural performance of PACS. This helps the management of PACS in assessing whether structural strength is reflected in financial results. The quadrant classification thus integrates structural performance and profitability into a single evaluative framework. With this approach, the quadrant analysis moves beyond traditional single indicator performance evaluation strategies.

The substantial heterogeneity among PACS both in structural capacity and profitability outcomes is evident from Table 7.6. In this table, four different categories of PACS are visible in four quadrants. High GLOSP–High Profit quadrant displays balanced strength across growth, liquidity, operational efficiency, and solvency dimensions. PACS included in this quadrant is therefore strong and profitable.

In contrast, PACS classified under the High GLOSP–Low Profit quadrant has sound structural foundations but weaker profitability. Even though these PACS have strong structural base, their profitability is comparatively lower. This may be because

of the influence of short-term operational, market, or policy constraints rather than fundamental institutional weaknesses.

The Low GLOSP–High Profit quadrant PACS show profitability despite with low composite performance. The profitability of these PACS may be from temporary, location-specific, or non-structural factors. If these underlying structural deficiencies are not properly rectified, these institutions may face financial problems over time. The Low GLOSP–Low Profit quadrant includes PACS with low GLOSP score and low profitability. These societies are the weakest that should get immediate strategic attention.

The joint GLOSP- profitability assessment demonstrate that profitability alone is not a sufficient indicator of PACS' performance. Multidimensional assessment is necessary to evaluate the performance dynamics of PACS. GLOSP performance evaluation framework is capable of making the performance dynamics of PACS at multidimensional level.

Overall, the joint GLOSP–profitability synthesis reinforces the relevance of the GLOSP model as a comprehensive performance evaluation framework for PACS. The model enables differentiated diagnosis of PACS' performance and supports evidence-based strategy formulation through policy recommendations. It helps to distinguish between structurally strong but operationally constrained PACS and those requiring deeper institutional reforms.

7.11 Validation of GLOSP Index

In order to examine whether higher multidimensional performance, as captured by the GLOSP framework, is associated with improved profitability outcomes of PACS, correlation analysis is employed between the Composite GLOSP Index and key profitability measures, namely Return on Working Capital (ROWC) and Net Profit Margin (NPM). It examines whether composite structural performance aligns with independent profitability outcomes. This correlation analysis serves as an important validation tool by assessing the strength and direction of association between structural performance and financial results.

Table 7.7: Correlation between the Composite GLOSP Index and Key Profitability Measures

Profitability Measure	Correlation with GLOSP	p-Value
ROWC	0.6629	0.0000
NPM	0.6538	0.0000

Source: Computed by the researcher using Composite GLOSP Index values and profitability indicators derived from audited secondary data obtained from the CAMIS database.

The correlation analysis proves strong positive relationship between the Composite GLOSP Index and the two profitability measures. The correlation between GLOSP and Return on Working Capital (r = 0.663) shows that PACS with higher composite performance tend to achieve better returns on working capital. Similarly, the positive correlation between GLOSP and NPM (r = 0.654) suggests that stronger multidimensional performance is associated with higher profit margins.

In both cases, the p-values are very low and this confirms that these relationships are statistically significant. This supports the construct relevance of the GLOSP index as a multidimensional indicator.

Additional evidence is presented in *Annexure VI (Mean GLOSP Index – Profit PACS vs Loss PACS)*

7.12 Integrated Validation and Model Synthesis

All validation exercises show consistent association with key profitability measures. It also clearly differentiates between profit-making and loss-making institutions and exhibits stable ranking patterns over time. These results indicate internal coherence and confirm the diagnostic value of the framework.

The joint GLOSP–profitability classification further emphasises that performance dynamics of PACS cannot be explained by short-term profits alone. Profitability is closely linked to the underlying structural dimensions of PACS and therefore the association between structural and operational aspects of PACS is very important in evaluating institutional performance of PACS. This necessitates the multidimensional approach in performance evaluation. Taken together, the GLOSP framework is capable of practical benchmarking and performance assessment of PACS at multidimensional level.

7.12.1 Application of the GLOSP Model for Performance Classification of PACS

The present study developed the GLOSP model and empirically applied the model to the sample PACS using audited financial data. For the purpose of performance evaluation of the selected PACS, the dimension-wise indices were computed for growth, liquidity, operational efficiency, and solvency. As a next step, these indices were then integrated to construct the Composite GLOSP Index. This composite index is used for further analysis of performance.

Thus, using the composite index values, PACS were ranked, classified, and evaluated across different performance categories. Thus, the financially sustainable, moderately stable, vulnerable, and distressed societies were identified accordingly.

The application of the model demonstrates the practical value of the GLOSP framework as a diagnostic and evaluative tool for assessing institutional performance. *(Ref: Annexures VI & VII)*

7.13 Discussion

The multidimensional performance dynamics of PACS in Kerala was examined in this study using the GLOSP framework developed in this research. This section discusses the empirical findings of the study and their practical interpretations.

7.13.1 Analytical Interpretation Based on the GLOSP Framework

The empirical findings point towards the multidimensional nature of financial performance among PACS. The GLOSP framework therefore conceptualises the institutional performance as the outcome of interrelated dimensions such as growth, liquidity, operational efficiency, and solvency. Previous literature on financial institution performance assessment supports this view (Berger & Humphrey, 1997; Athanasoglou, Brissimis, & Delis, 2008).

As per the pooled cross-sectional regression analysis operational efficiency and growth-related factors play a prominent role in explaining profitability differences across PACS. Some earlier studies have already identified that structural efficiency and scale characteristics influence long-run performance in banking and cooperative institutions (Sealey & Lindley, 1977; Berger & Mester, 2003). This suggests that PACS that utilise resources efficiently and expand their business operations attain higher profitability than their counterparts.

However, the fixed-effects panel estimation revealed that liquidity and solvency are more influential determinants of within-PACS profitability variation over time. This result is consistent with panel econometric theory. The theory emphasises that fixed-effects models capture short-term internal adjustments rather than cross-sectional structural differences (Hsiao, 2014; Wooldridge, 2010).

The difference between pooled and panel results can be attributed to the distinct analytical roles of the two approaches rather than inconsistency. The *between-institution variation* is explained in Pooled OLS estimation and this highlights why certain PACS remain persistently profitable. On the other side, Fixed-effects estimation, explains *within-institution variation* by examining how changes in financial management influence profitability over time. Previous studies on banking across different economic contexts, have been observed similar distinctions between structural and dynamic determinants of profitability (Athanasoglou et al., 2008; Dietrich & Wanzenried, 2011).

Further analysis brought out another analytical finding, that once institution-specific heterogeneity is controlled, no single financial dimension independently explains within-PACS profitability changes. This suggests that short-term profitability outcomes are not arise form isolated indicators, but from interacting financial conditions.

Another insight was derived from the logistic and marginal effects analyses. The results reveal that improvements in liquidity and solvency significantly increase the probability of a PACS being profit-making. Such findings are consistent with probabilistic approaches to financial distress prediction, which emphasise liquidity buffers and balance-sheet strength as key determinants of institutional survival (Altman, 1968; Beaver, 1966). Profitability in cooperative institutions derive from the interaction of underlying financial discipline rather than as a standalone performance indicator.

These empirical evidences from analyses confirm the multidimensional logic of the GLOSP framework. As per this, the performance of PACS emerges from the interaction of various structural and operational characteristics of them. No single indicator or dimension can explain their performance outcomes independently. These

findings support the conceptual foundation of GLOSP as an integrated diagnostic framework capable of capturing the multidimensional nature of cooperative performance.

7.13.2 Practical Interpretation in the Context of PACS Functioning

The GLOSP framework provides a structured analytical assessment of multidimensional performance of PACS and helps to interpret the results within their operational and institutional context. NABARD and RBI have already pointed out the distinct governance structures, regulatory constraints, and socio-economic objectives of PACS, which shape their performance outcomes differently from commercial banks (NABARD, 2022; RBI, 2021).

7.13.2.1 Structural and Institutional Aspects

The empirical findings indicate that structural strength of PACS is the basis of their sustainability. Dimensions such as growth and solvency are widely recognised in literature as essential determinants of cooperative resilience (NABARD, 2021). PACS with stronger capital bases and balanced growth patterns have greater ability to absorb financial shocks. Such ability is important for PACS especially in times of economic uncertainty. It is also observed that societies that maintain stable capital structures and prudent expansion are better positioned to sustain operations over time.

These findings reinforce that persistent financial distress in cooperatives is mainly because of structural weaknesses rather than from temporary operational inefficiencies. Therefore, strengthening institutional foundations of PACS is a critical prerequisite for improving their long-term performance.

7.13.2.2 Operational Management and Efficiency Aspects

Another observation is that operational efficiency is an important factor that differentiate stronger PACS from weaker ones. Societies with higher operational efficiency – or with lower operating costs and better resource utilisation - often demonstrate relatively stronger financial performance. In contrast, poor operational efficiency, because of elevated administrative expenses, limited staff productivity, and underutilised infrastructure constrains institutional efficiency in many PACS.

Policy assessments consistently highlight that operational and structural inefficiencies weaken internal control systems and this leads to financial distress in

many PACS (RBI, 2020; Government of India, 2022). Poor cost management and inadequate monitoring mechanisms increase operational costs and thereby reduce institutional performance even when business volumes remain stable.

The findings of the present study thus indicate the importance of operational performance and cost management for strengthening PACS. Administrative efficiency is also essential to improve operational effectiveness of PACS.

7.13.2.3 Financial Management and Liquidity Aspects

Liquidity management is the other factor which plays a critical role in the functioning of PACS within the cooperative credit structure. Maintaining adequate liquidity is highly essential for financial institutions which depend heavily on short term funds. PACS are functioning at grassroot level and depend heavily on short term funds and refinance arrangements. Therefore, liquidity is very crucial for them.

The panel analysis conducted in this study shows a strong association between liquidity and profitability of PACS. This finding suggests the importance of prudent cash-flow planning, efficient loan recovery, and strategic deployment of available funds. Societies that manage these aspects effectively can maintain financial stability.

Policy assessments repeatedly identify liquidity stress as a major reason for operational disruptions in PACS (NABARD, 2022). Poor recovery management, mismatches between deposits and credit deployment, and weak cash-flow management can quickly affect liquidity of PACS. Effective liquidity management therefore serves as an immediate stabilising mechanism, in PACS even if these PACS have sound structural characteristics.

7.13.2.4 Solvency and Risk Management Aspects

Solvency indicators reflect the long-term financial discipline of PACS and the overall stability of their balance sheet. Strong solvency conditions indicate greater institutional resilience and long term financial stability.

The findings of the study show that PACS with adequate solvency exhibit increased profitability over time. Solvent societies have greater capacity to absorb financial shocks and maintain operational continuity. This observation demands

regulatory emphasis on strengthening capital adequacy and improving balance-sheet quality within the cooperative sector (RBI, 2021).

Solvency therefore occupies double sided impact. On one side, it is an indicator of financial health, and on the other side, an important safeguard against institutional vulnerability. Therefore, strengthening solvency conditions can enhance the long-term stability of PACS and reduce exposure to short term financial challenges.

7.13.2.5 Managerial and Governance Implications

Analytical results often indicate the combined influence of efficiency, liquidity, and solvency dimensions in the performance dynamics of PACS. Societies with stronger management practices and better internal controls can perform more effectively across financial dimensions. In contrast, weak governance structures, limited professional expertise, inadequate monitoring mechanisms, and ineffective recovery management limit the performance of PACS.

Studies regularly emphasise the need for professional management, improved accountability, and stronger audit systems within the cooperative sector for their improved performance (Government of India, 2022; NABARD, 2021). Managerial efficiency and operational control are essential for strengthening institutional discipline and improving financial sustainability. The findings of the present study support these policy perspectives by showing that differences in financial performance of PACS are closely associated with differences in managerial and operational conditions.

Overall, the interpretation of the GLOSP results indicates that performance of PACS is emerged out of the combined interaction of structural capacity, operational discipline, financial management practices, and governance effectiveness. Profitability outcomes of PACS therefore reflect the institutional strengths and weaknesses of them. The GLOSP framework supports this understanding by translating complex financial indicators into integrated diagnostic insights. These insights provide guidelines to regulators, cooperative departments, and institutional stakeholders in framing policies and strategies accordingly.

Another point highlights that the financial performance of PACS is resulted from the interaction of structural capacity, operational efficiency, liquidity management, and solvency discipline. While the GLOSP framework provides an integrated assessment of these dimensions, the empirical findings also reveal specific areas that require targeted intervention. These observations underscore the need for converting analytical evidence into practical policy measures; and this is the exact place where GLOSP model can effectively contribute.

7.14 Summary of Analysis

This chapter constructed and applied the Composite GLOSP Index to evaluate the multidimensional institutional performance of PACS. For this purpose, at first the dimension-wise indices relating to growth, liquidity, operational efficiency, and solvency were standardised and then aggregated to generate the composite performance measure.

The process continued with ranking of PACS, examination of ranking stability over time, and quadrant-based classification of PACS. These exercises revealed substantial heterogeneity among PACS especially in institutional strength and operational performance. These processes also highlighted the need for evaluating the performance of PACS on a multidimensional basis.

As a next step, validation was carried out by examining the correlation between the Composite GLOSP Index and profitability measures. The examination produced positive and statistically significant associations, and thus confirmed the internal coherence and diagnostic relevance of the GLOSP framework.

In summary, the results demonstrate that the Composite GLOSP Index can effectively function as a structured benchmarking and performance assessment tool for PACS. The framework is a systematic basis for institutional evaluation which can provide analytical support for evidence-based policy formulation.

Chapter 8

POLICY IMPLICATIONS AND STRATEGIC RECOMMENDATIONS

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CHAPTER VIII

POLICY IMPLICATIONS AND STRATEGIC RECOMMENDATIONS

8.1 Introduction

This chapter presents evidence-based policy and strategic recommendations for the strengthening of the financial sustainability, operational efficiency, and institutional viability of PACS in Kerala. In continuation to the earlier chapters, which focused on empirical analysis, the present chapter interprets those findings in policy terms. Based on the multidimensional performance assessment and determinant analysis, the present discussion proposes differentiated interventions that recognise institutional heterogeneity rather than assuming uniform policy applicability.

8.2 Key Determinants of PACS Performance

Table 8.1 presents a comprehensive picture of policy-oriented synthesis of the key determinants of PACS performance, derived from the regression and composite index analysis. The table consolidates statistical evidences from multiple analytical techniques used in the study—including mean difference analysis, panel regression models, and profitability validation—into an interpretable framework for policy formulation. Instead of reproducing statistical coefficients, the table presents empirical results into directional influence, strength of evidence, and policy relevance, thereby facilitating translation of empirical findings into policy interpretation. For the purpose of better policy interpretation, the statistically derived determinants are reorganised into a qualitative synthesis framework.

Table 8.1 Empirically Supported Dimensions of PACS Performance: Policy Synthesis Summary

Dimension	Empirical Evidence Pattern	Interpretation Across Models	Policy Relevance	Strategic Implication
Growth	Weak and inconsistent association	No independent effect observed after controlling for	Limited direct policy leverage	Growth expansion should follow structural strengthening

		institutional heterogeneity		rather than precede it
Liquidity	Consistent association in probability models; not significant in panel estimations	Relevant for profitability likelihood rather than continuous profitability levels	High	Strengthening liquidity buffers is associated with improved resilience, and reduces distress risk
Operational Efficiency	Significant in pooled models; not significant in panel models	Reflects cross-sectional institutional differences rather than persistent within-institution effects	Moderate	Efficiency improvements may enhance comparative performance but do not independently drive dynamic profitability
Solvency	Directional but statistically weak relationships	Indicates structural stability rather than direct profitability effect	Moderate	Capital strengthening supports institutional sustainability rather than immediate profitability
Multidimensional Interaction	Strongest explanatory pattern across models	Profitability outcomes arise from combined financial conditions rather than isolated dimensions	Very High	Integrated monitoring frameworks are more effective than single-indicator interventions

Source: *Synthesised by the researcher based on empirical findings of the study.*

The synthesis presented in Table 8.1 shows that institutional performance among PACS cannot be explained by any single financial dimension operating independently. Profitability outcomes of PACS are resulted from the interaction of multiple structural conditions. These findings support the adoption of

multidimensional monitoring such as GLOSP, for evaluating cooperative institutions. GLOSP provides a more comprehensive basis for policy assessment than reliance on isolated financial indicators.

8.3 Policy-Based Dashboard

Chart 8.1 presents a compact, policy-oriented visual synthesis of the study's key findings. The dashboard given in the chart complements Table 8.1 in visualising performance distribution and, the relative importance of major determinants. It also visualises the joint classification of PACS based on structural performance and profitability.

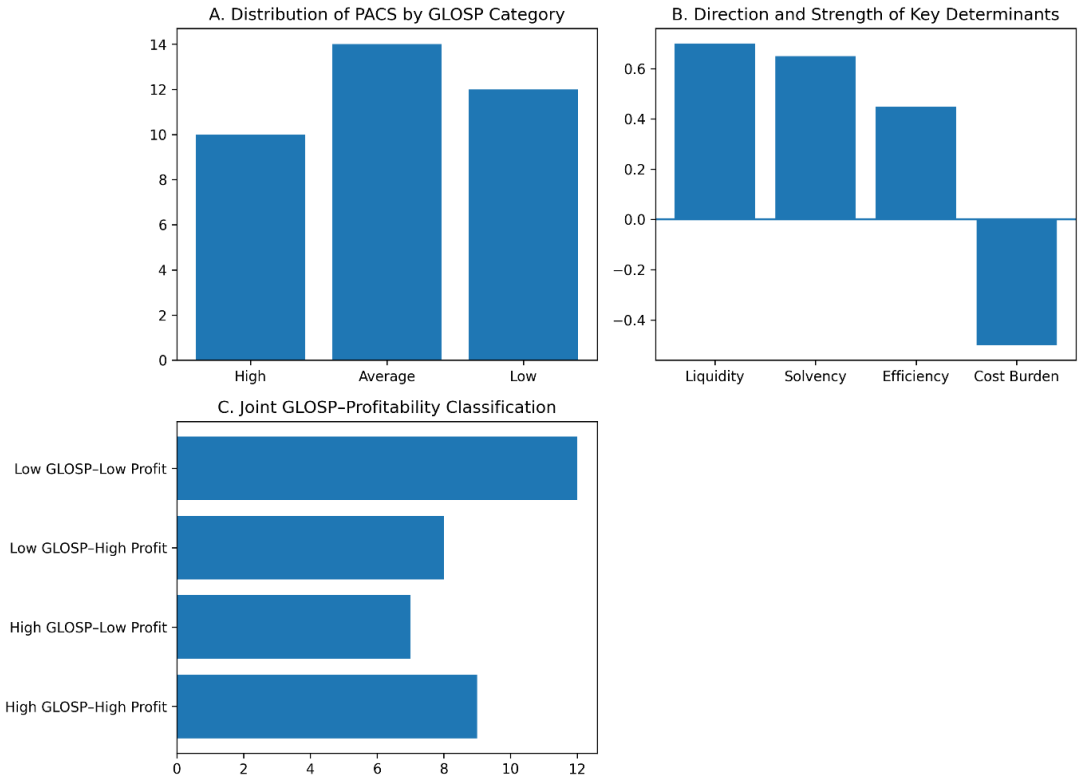

Chart 8.1: Policy-Oriented Dashboard of PACS Performance and Key Determinants

Panel A: Distribution of PACS by GLOSP Category

Panel A shows the classification of PACS into high, moderate, and low-performance groups based on composite index values. This categorisation provides relative institutional strength of various performance categories of PACS and provides a structured basis for comparative policy interpretation.

Panel B: Direction and Strength of Key Determinants

Panel B exhibits determinant directions across financial dimensions. This indicates whether the variables exert positive, negative, or statistically insignificant associations with performance outcomes. The panel can be taken as a condensed interpretive guide to the regression results reported in the analytical chapters.

Panel C: Joint GLOSP–Profitability Classification

Panel C is the visual presentation of the quadrant-based classification combining structural strength and realised profitability. This framework distinguishes institutions with strong fundamentals but weak outcomes, as well as those with strong outcomes with weak fundamentals, thereby supporting differentiated policy interpretation.

Overall, the dashboard presents performance distribution, determinant direction, and structural–profitability alignment. The dashboard confirms that institutional sustainability depends on balanced financial conditions rather than isolated performance indicators.

8.4 Consolidated Strategic Implications Based on GLOSP Performance Classification

The analytical results indicate substantial heterogeneity in financial and operational performance among PACS. The GLOSP framework can classify these societies based on their structural strength and profitability outcomes, so as to facilitate differentiated and institution-specific policy interventions rather than uniform corrective measures.

The composite GLOSP scores and profitability status, broadly categorise PACS into four strategic groups, so that distinct policy orientation and managerial focus can be designed to each.

8.4.1 High GLOSP – Profitable PACS (Sustainable Performers)

PACS falling under this category have high GLOSP score and profitability. The PACS in this category exhibit strong structural fundamentals along with sustained profitability. These societies demonstrate balanced growth, adequate liquidity

management, operational efficiency, and solvency stability. Such PACS, require consolidation and scalability rather than corrective intervention.

Strategic recommendations to such PACS include encouraging diversification into allied activities, adoption of advanced digital services, and utilisation of these societies as model institutions for peer learning. Strengthening autonomy, incentivising innovation, facilitating inter-society knowledge transfer etc. may further enhance their role as anchors of cooperative stability within the state.

8.4.2 High GLOSP – Loss-Making PACS (Structurally Strong but Financially Distressed)

This category represents societies with high GLOSP score but with weak financial results. Such PACS have adequate structural capacity but weak profitability outcomes. These PACS make losses not because of financial stress, but because of operational and managerial factors.

Policy interventions for these PACS should prioritise measures to improve managerial efficiency. Fund utilisation and loan management strategies need to be improved, and loan recovery mechanism should be strengthened. Targeted measures such as cost rationalisation, strengthening of recovery mechanisms, and improvement in internal controls may help translate structural strength into sustainable profitability. These societies present high revival potential and it should be properly guided.

8.4.3 Low GLOSP – Profitable PACS (Fragile Profit Performers)

PACS in this group are profitable but with low GLOSP score. These PACS attain profits even under weak structural fundamentals. Profitability without proper structural strength may not be sustainable and dependable. Such performance may be out of situational or short-term conditions. These PACS need appropriate institutional strengthening efforts.

Strategic focus for these PACS should be focused on strengthening liquidity buffers, improving capital adequacy, and enhancing operational discipline. Preventive interventions are also essential to convert short-term profitability into long-term financial stability.

8.4.4 Low GLOSP – Loss-Making PACS (Structurally Weak Institutions)

Low GLOSP – Loss-Making group constitutes the weakest PACS. These PACS have low GLOSP score as well as low profitability. These societies face many operational, and structural challenges and multiple financial issues. Low recovery rates, high operating costs, poor liquidity management, and weak recovery management are the common issues faced by this category of PACS.

Policy recommendations for these PACS must be specifically designed considering the unique situations of the society. Selective and evidence-based policy interventions should be framed for these PACS. Uniform revival measures may not be effective for this category. Suggestions for improvement may include, intensive restructuring, administrative consolidation, managerial overhaul, or in extreme cases, merger, or liquidation etc.

8.5 Strategic Value of the GLOSP Framework for Policy and Institutional Governance

The classification of societies based on the composite score, highlights the analytical usefulness of the GLOSP framework as a diagnostic decision-support tool. As the framework is capable of distinguishing structural capacity from profitability outcomes, it can support targeted interventions aligned with the specific condition of each society. The model can guide rational allocation of supervisory attention, efficient deployment of revival resources, and continuous performance monitoring using standardised indicators.

8.6 Synthesis of Strategic Implications

The consolidated analysis emphasises that PACS in Kerala cannot be addressed through uniform policy interactions. Financial sustainability of PACS is determined by combinations of structural strength and operational outcomes. The dynamic nature of these structural and operational characteristics also to be addressed properly. The GLOSP framework can effectively capture this heterogeneity and can provide empirically evidenced and specifically formulated policy design to the targeted PACS.

GLOSP framework integrates multidimensional performance diagnostics with profitability outcomes, and therefore its interventions are not reactive, but preventive. This increases the practical relevance of the study as it links empirical findings of the evaluation, with policy design.

8.7 Institutional and Regulatory Implications

The GLOSP model developed in this study is a practical performance measurement tool for monitoring and supervisory assessment of PACS. Cooperative department and apex authorities can effectively make use of the framework for periodic performance evaluations, and early diagnosis of financial vulnerability, and evidence-based allocation of institutional support and supervisory resources. Importantly, the diagnostic orientation of the GLOSP model enables strategic application of precautionary measures aligned with cooperative ethos and ensures capacity enhancement.

8.8 Policy Recommendation Matrix: Linking Problems, Empirical Evidence, and Strategic Actions

Table 8.2 presents a policy recommendation matrix based on multidimensional performance evidences that can be applied in strategic policy decisions. This matrix is developed to systematically link identified institutional problems with evidence from the study and corresponding strategic interventions. Thus, this matrix provides a structured framework connecting analytical outcomes with actionable policy directions.

Table 8.2 Policy Recommendation Matrix Based on Multidimensional Performance Evidence

Performance Condition	Empirical Evidence Pattern	Diagnostic Interpretation	Recommended Policy Response	Strategic Priority
Low Liquidity Stability	Consistent association with profitability probability; weak panel effects	Indicates vulnerability to short-term financial stress	Strengthen working capital monitoring, liquidity buffers, and deposit	High

			mobilisation strategies	
Weak Operational Efficiency	Significant in cross-sectional models only	Reflects structural performance gaps between institutions	Improve cost control systems, audit monitoring, and operational process optimisation	Moderate
High Overdues / Credit Risk	Directional negative association across models	Signals institutional stress rather than immediate profitability decline	Strengthen recovery mechanisms, borrower screening, and credit monitoring	High
Weak Capital Adequacy	Directionally related to stability indicators	Indicates long-term solvency concerns	Gradual capital strengthening and risk-weighted asset monitoring	Moderate
Uneven Growth Patterns	Weak statistical evidence	Expansion not inherently linked with profitability	Emphasise sustainable growth rather than rapid expansion	Low
Multidimensional Structural Imbalance	Strongest pattern across models	Performance reflects interaction of multiple financial conditions	Implement integrated monitoring dashboards combining liquidity, efficiency, and solvency metrics	Very High

Note: Policy recommendations are derived from combined evidence across descriptive analysis, regression models, and classification diagnostics presented in Chapters V–VII. Relationships are interpreted as empirical associations rather than causal effects.

The policy matrix translates empirical evidences into operational guidance considering the financial conditions of PACS. The recommendations emphasise structural strengthening of PACS rather than single-indicator correction.

8.9 Case Study Mini Profile

The quadrant-based framework shows how the structural strength and profitability outcomes of PACS interact to attain the targeted performance. For the purpose, the PACS are classifies as sustainably strong, profit-constrained, structurally vulnerable, and distressed. The GLOSP framework enables this classification as well as the formulation of targeted policy responses to each. Such an approach is helpful in efficient allocation of regulatory attention, institutional support, and capacity-building resources to the targeted PACS.

To illustrate the practical application of the GLOSP framework, certain representative PACS-level case profiles are provided in Annexure VIII. These profiles are meant for demonstration and do not form the basis for empirical inference.

Overall, the synthesis of empirical findings, policy-oriented summaries, and illustrative applications emphasises the practical importance of the GLOSP framework as a comprehensive performance evaluation tool for PACS evaluation. The framework integrates multidimensional quadrant-based interpretation. This integrated approach provides clear and specific understanding of the performance of PACS. By combining structural performance indicators with profitability outcomes, the framework provides a structured basis for evidence-based policy formulation. This approach improves the financial sustainability, operational efficiency, and long-term viability of PACS in Kerala.

8.10 Discussion

The results emphasise that policy based strategic action plans are required for PACS, based on multidimensional performance evaluation. This points towards necessity of GLOSP performance evaluation framework that provides a structured empirically grounded balanced assessment of PACS. The findings also do not support growth-centric or profit-centric performance evaluation strategies for PACS.

The study also highlights the balanced development across various dimensions of PACS' performance such as liquidity, efficiency, and solvency. Beyond statistical relationships, the findings provide practical suggestions to improve the overall functioning of PACS, in the areas of operational practices, managerial decision-making procedures, and regulatory interface.

The following discussion contextualises the empirical results within these realities.

8.10.1 Institutional and Practical Interpretation of Findings

Several studies have emphasised that cooperative institutions cannot be evaluated solely through financial indicators. (Shah & Mishra, 1992; Niranjan Raj, 1998). Based on this view, the empirical findings of this study, indicate that profitability outcomes of PACS are emerged as the combined result of their operational practices, structural constraints, and managerial capacities. This supports the analytical findings and GLOSP approach.

8.10.2 Operational Dimensions and Functional Constraints

Hussain (2007) and Ramachandran (2005) pointed out that the PACS has problems in accounting accuracy, loan monitoring, and recovery follow-up. They added that many PACS function with limited staff strength, inadequate training, and weak internal control mechanisms. Operational inefficiencies observed in the present study among low-performing PACS are consistent with these findings. Some studies have pointed out that the secretary performs multiple roles simultaneously, including credit administration, bookkeeping, compliance reporting, and member interaction. Such multitasking often limits output and its quality. Empirical studies by Feroze (2012) and Devi and Vijayan (2021) support these observations. These studies show that managerial inefficiency, rather than scale limitations, causes performance differences among cooperative institutions. The consistent association between operational efficiency and profitability of PACS is the major factor attended by the GLOSP evaluation framework.

8.10.3 Structural Limitations and Financial Autonomy

Many studies have pointed out the structural weaknesses of PACS such as low capital adequacy and high dependence on borrowings as the reasons for their poor performance. Narayanaswamy (2002) observes that inadequate share capital and limited reserves of PACS lead them to high-cost borrowing, and this increases interest burden and reduces net surplus. Swarup (2010), argues that weak internal capital formation weakens financial autonomy of PACS. The analytical results of the present study, also support these arguments with the finding that excessive leverage negatively influences profitability of PACS.

Moreover, Belay et al. (2004), commented that growth in loan portfolios without proportional operational efficiency increases financial vulnerability. This study supports the opinion with the finding that expansion in business volume does not automatically translate into improved profitability, particularly in societies with weak capital bases.

8.10.4 Managerial Capacity and Governance Practices

Managerial competence and governance quality of cooperatives have been included in many cooperative finance research. Shah and Mishra (1992) presented cooperatives as interlinked subsystems wherein governance failure in one-dimension affects other related operational and financial outcomes. Niranjan Raj (1998) further emphasises that leadership quality, transparency, and financial discipline have positive influence on profitability and sustainability of PACS. Some Kerala based studies support this view. Hussain (2007) finds that politically influenced lending and lenient recovery practices are the major weaknesses of Kerala PACS. Tripathy et al. (2021) complements this saying that participatory governance and managerial accountability improve operational efficiency and competitiveness.

The present study finds that PACS functioning in similar environments produce different financial outcomes because of the structural and operational differences of individual PACS. This can be attributed to variations in managerial effectiveness rather than resource availability alone.

8.10.5 Recovery Culture and Credit Discipline

Many studies have pointed out that poor loan recovery performance is the central practical problem of PACS. Khusro Committee (1986) and Sasikumaran Nair (2002) indicate the issue saying that, weak recovery culture is the structural problem of PACS. These studies also point out the reasons such as political interference, expectations of loan waivers, and social proximity between borrowers and management. Ghosh et al. (2018) further says that both distress-induced and wilful defaults, create significant financial pressure on cooperatives. Vishnu and Selvanayaki (2018) establish an inverse relationship between NPAs and financial performance. These results underline that recovery efficiency of PACS is not a financial outcome, but it is the result of operational and governance-related condition. The present study's empirical evidence validates these findings.

8.10.6 Institutional Heterogeneity and Policy Limitations

The coexistence of profit-making and loss-making PACS under similar regulatory conditions reduces the effectiveness of standardised policy interventions. Several scholars pointed out that uniform revival and recapitalisation schemes are not effective to address institution-specific weaknesses existing in PACS (Task Force on Revival of Cooperative Credit Institutions, 2004; Swarup, 2010). Such interventions do not correct underlying operational inefficiencies or governance deficiencies of individual PACS as their problems and structural bases are different. As noted by Bhattacharyya and Sinha (2021), heterogeneity among cooperatives necessitates differentiated policy approaches. The quadrant-based classification derived from the GLOSP framework empirically supports this interpretation, and provide guidelines to PACS' specific decision making.

8.10.7 Implications for Monitoring and Institutional Governance

The findings emphasise the importance of changing the nature of cooperative supervision from reactive responses to diagnostic and preventive governance. Scholars such as Feroze (2012) and Devi and Vijayan (2021) highlight the need for a multidimensional monitoring framework that capture early signs of financial stress beyond profit centric post mortem evaluation. The proposed GLOSP framework

aligns with this recommendation and provides a structured framework for diagnostic and preventive governance. It facilitates early warning identification and targeted supervisory intervention.

8.10.8 Bridging Empirical Evidence with Cooperative Practice

Overall, the literature and empirical findings conclude that sustainable profitability of PACS depends on alignment between structural capacity, operational discipline, managerial competence, and governance accountability. Financial indicators gain substantive meaning only when interpreted within this multidimensional context (Shah & Mishra, 1992; Niranjan Raj, 1998). By embedding quantitative analysis within cooperative realities, the present study contributes to bridging the gap between empirical analysis and institutional level practical realities.

8.11 Chapter Summary

This chapter synthesised empirical findings into policy-relevant interpretations with a view to strengthen institutional sustainability, operational efficiency, and financial resilience of PACS in Kerala. By translating analytical results into structured policy-based guidance, target oriented interventions, and strategic practical recommendations, the chapter demonstrates how multidimensional performance assessment can improve cooperative governance. The study suggests that only differentiated policy measures recognising institutional heterogeneity can make improvements in the performance of PACS. Overall, the analysis establishes the GLOSP framework as a structured decision-support tool for policy makers and administrative authorities of individual cooperatives.

Chapter 9

SUMMARY, CONCLUSION, AND SCOPE FOR FURTHER RESEARCH

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CHAPTER IX

SUMMARY- CONCLUSION- AND SCOPE FOR FURTHER RESEARCH

9.1 Introduction

This chapter consolidates the principal findings of the study, and outlines the theoretical and methodological contributions. This chapter again synthesises the analytical, empirical, and conceptual insights of the study and presents the overall conclusions on performance dynamics of PACS in Kerala.

9.2 Summary of the Study

The study was undertaken on the understanding that there exists persistent financial heterogeneity among PACS in Kerala, which function under similar institutional, regulatory, and policy framework. The uneven financial results of PACS raise huge concerns regarding their governance, efficiency, and sustainability, especially when these PACS have significant role in the rural economy of Kerala.

To address this issue, the study adopted a multidimensional analytical approach. As per this, profitability is considered as a dynamic outcome of PACS' performance, and this is shaped by structural, operational, and managerial factors of individual PACS. Using audited secondary data obtained from the CAMIS, the study analysed a sample group of PACS over a five-year period. The study proceeded through a structured analytical framework involving institutional structure assessment, multidimensional performance modelling, determinant analysis, and composite index construction.

A major conceptual innovation of the study is the development of the *GLOSP Performance Evaluation Framework*, integrating Growth, Liquidity, Operational Efficiency, and Solvency indicators as performance dimensions, and profitability as a performance outcome.

9.3 Summary of Major Findings

Summary of the major findings of the study are given below:

9.3.1 Structural Characteristics of PACS

The analysis shows that there exists substantial heterogeneity in the structural composition of PACS in terms of scale, asset base, working capital, income composition, and geographical distribution. Coexistence of profit-making and loss-making PACS within the same districts, indicate that external environment is not the only reason for the performance differences. Structural disparities existing among profit and loss PACS should be considered along with this finding. Together, these findings point that internal institutional characteristics have a stronger role in shaping financial outcomes.

9.3.2 Multidimensional Nature of Performance

The results indicate that the performance for PACS cannot be properly evaluated with profit, recovery percentage, or business volume. Performance of PACS is multidimensional and it cannot be adequately captured through these single indicators. Financial performance of PACS is the combined result growth, liquidity, efficiency, and solvency dimensions. The GLOSP framework presented in this study is a coherent structure to capture these interdependencies and their performance assessment.

9.3.3 Performance Dynamics and Empirical Contribution

The empirical analyses undertaken in this study indicates that variations in profitability of PACS are because of the differentiated institutional conditions. Liquidity management and operational efficiency displayed comparatively stronger statistical associations with profitability outcomes across selected model specifications, but these relationships could not be proved once institution-specific heterogeneity is controlled through panel estimation. It was found that, growth and solvency indicators, in contrast, function primarily as contextual or stabilising dimensions rather than direct explanatory factors.

This pattern suggests that profitability differences among PACS are because of the interaction of multiple financial conditions existing in PACS. The combined interpretation across modelling strategies supports that institutional outcomes are emerged from multidimensional configurations of liquidity stability, operational efficiency, capital structure, and growth patterns.

In this respect, the study's principal empirical conclusion is that performance assessment frameworks based on isolated indicators are analytically insufficient for cooperative financial institutions. Further, the liquidity management and operational efficiency are comparatively the most influential performance dimensions associated with profitability variation rather than as deterministic drivers. This distinction is to be considered while making analytical interpretation and policy formulation.

By empirically establishing the multidimensional nature of performance dynamics, the study demands certain changes in the analytical frameworks used for cooperative performance evaluation, especially a shift from single indicator based, profit or loss evaluation strategies. As a solution to these, the research presents an evidence-based multidimensional performance evaluation model for the purpose - such as the GLOSP composite index.

9.3.4 Profitability Level versus Profitability Status

Another key analytical insight of the study makes a distinction between profitability level and profitability status. The study could find that certain factors explain the degree of profitability of PACS, while others influence the probability of being profitable. This answers the question why some PACS generate temporary profits despite weak structural foundations, and while others with strong capacity experience short-term losses.

9.3.5 Composite Performance Assessment

As part of the performance evaluation, the research constructed the composite GLOSP index which enables classification of PACS into distinct performance categories. GLOSP classifies PACS under four categories considering their structural strength and profitability outcomes. These classifications enable the management in their policy and managerial decisions.

9.3.6 Policy and Institutional Implications

The findings of the study highlighted the drawbacks of uniform revival strategies and policy decisions on PACS. PACS differ in performance and outcomes, and therefore, the study demanded for differentiated, evidence-based interventions focusing on the specific issues of individual PACS.

9.3.7 Overall Findings

Persistent financial differences among PACS operating under similar policy environments reveal that internal institutional dynamics have major role in shaping the performance dynamics of PACS. Performance cannot be sustained through expansion of business volume or financial assistance; it requires balanced institutional development across multiple performance dimensions. The GLOSP framework developed in this study provides a systematic and transparent method for diagnosing institutional health and benchmarking performance. Its application demonstrates that cooperative sustainability depends not merely on survival or profitability, but on the alignment of financial capacity, governance quality, and operational discipline.

9.4 Central Thesis Statement

The central thesis of this study is that the financial sustainability of cooperative credit institutions is not determined by individual financial indicators but emerges from the dynamic interaction of structural capacity, liquidity discipline, operational efficiency, and solvency stability, and therefore requires multidimensional evaluation frameworks for accurate diagnosis and policy design.

9.5 Contributions of the Study

Contributions of the present study especially to the cooperative finance literature, performance evaluation, administration, and policy making are detailed below:

9.5.1. Conceptual Contribution

The study establishes that, performance of PACS is a dynamic process derived from the interrelated structural and operational dimensions. Further, the profitability of PACS is not merely a financial outcome, but should be interpreted as an outcome of the underlying institutional conditions.

9.5.2. Model Development Contribution

Another contribution of the study is the development of the GLOSP performance evaluation framework, a multidimensional model integrating Growth, Liquidity, Operational Efficiency, and Solvency as performance dimensions, with profitability examined as an outcome.

9.5.3. Methodological Contribution

Another contribution of the study is the systematic, multi-layered analytical approach combining descriptive diagnostics, composite index construction, panel econometric modelling, and probabilistic classification techniques. The separation of profitability indicators from structural index construction ensures methodological robustness as it avoids circularity and enhances analytical validity.

9.5.4. Empirical Contribution

The study conducted a detailed empirical examination of PACS performance in Kerala using the official CAMIS database. It empirically evaluated the inter-society heterogeneity in financial outcomes, and highlighted the dominance of internal performance dynamics over external policy uniformity.

9.5.5. Policy and Governance Contribution

The study translates empirical findings into a differentiated policy framework through quadrant-based classification of PACS. For the purpose, the study used combined GLOSP scores and profitability outcomes. This facilitates targeted, institution-specific policy interventions in PACS.

9.5.6. Practical and Managerial Contribution

Next, the study provides proposes GLOSP as a diagnostic and early-warning tool, for cooperative management, regulators, and policymakers. It helps them in continuous monitoring, benchmarking, and evidence-based decision-making, thereby strengthening institutional sustainability of PACS.

9.5.7. Regional and Contextual Contribution

Focusing on Kerala, the study enriches regional cooperative finance literature by offering a replicable analytical tool that can be adapted to other states with similar institutional structures.

9.5.8 Theoretical Contribution of the Study

The study contributes to cooperative finance theory a systemic institutional framework, which extends performance analysis of PACS. The present research demonstrates that cooperative sustainability is more appropriately understood as a result of the multidimensional interaction among structural, operational, and financial

conditions. By empirically validating a composite diagnostic framework, the study advances the theoretical understanding of cooperative institutions as complex organisational systems rather than static financial entities. This perspective shifts the analytical focus from simple outcome measurement to the broader architecture of institutional performance.

9.5.9 Overall Contribution

Collectively, the study integrates conceptual clarity, methodological structure, and empirical evidence to strengthen understanding of cooperative financial performance. The GLOSP framework provides a structured basis for evaluating the performance dynamics of Kerala PACS.

9. 6 Epistemological Orientation of the Study

The study adopts an empirical evaluation that combines quantitative modelling with institutional interpretation. Statistical methods have used to identify structural relationships among the financial dimensions of PACS. At the same time, the interpretation of results is guided by institutional theory, which recognises that cooperative outcomes are shaped by governance structures, behavioural norms, and organisational processes. This integrative epistemological perspective allows empirical findings to be interpreted within the practical context of cooperative functioning. As a result, the analytical conclusions reflect institutional realities rather than being treated as purely statistical outcomes.

9. 7 Implications for Cooperative Governance and Rural Finance

The findings have broader implications for cooperative governance and rural financial sustainability. Strengthening PACS requires preventive, diagnostic, and institution-sensitive governance mechanisms, rather than reactive interactions. Performance monitoring systems must be able to incorporate early-warning indicators related to liquidity imbalance, cost inefficiency, and solvency erosion. It should not turn around profit-loss metric.

The study also emphasises the importance of capacity building, managerial professionalism, and accountability mechanisms in strengthening grassroots financial

institutions. Enhancing the performance of PACS, contributes directly to inclusive rural credit delivery and long-term financial sustainability.

9. 8 Scope for Further Research

The study opens several avenues for future research. Extending the time horizon of analysis would allow examination of long-term structural changes and the persistence of performance patterns among PACS. Applying the framework across different states could also enable comparative analysis of cooperative performance across regions. Further research may incorporate qualitative investigations into borrower behaviour, managerial decision-making processes, and governance practices. Such approaches would complement the quantitative analysis presented in this study. Another promising direction involves integrating credit risk modelling and stress-testing techniques with composite performance indices.

In addition, quasi-experimental evaluation of policy initiatives such as recapitalisation and revival schemes could provide deeper insights into the effectiveness of institutional reforms within the cooperative sector.

9. 9 Conclusion

PACS constitute the grassroot level financial institutions within India's rural financial system. Sustainability of these institutions is important for the rural economics development of the nation. The findings suggest that cooperative sustainability appears more as a function of internal institutional discipline. The issues related to PACS cannot be completely resolved with external support and uniform policy decisions. This challenges the traditional assumptions that financial distress among PACS is primarily resource-driven rather than governance-driven. By integrating multidimensional diagnostics with empirical analysis, the study provides a structured and adaptable tool for evaluating cooperative institutional performance. The GLOSP framework can effectively provide strategic contributions in promoting sustainable rural financial development in Kerala. Its adaptable design also allows application in other regions with similar cooperative institutional systems.

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Annexure 1

Profit Performance of PACS in Kerala

Indicators	No.of Societies	Dormant Societies	Societies on Profit	Profit Amount	Societies on loss	Loss Amount	Societies without profit or loss (Under Liquidation)
Years	*No.s*	*No.s*	*No.s*	*Rs in crore*	*No.s*	*Rs in crore*	*No.s*
2015	1642	30	1013	1279.01	535	851.96	64
2016	1647	35	1020	1199.71	532	976.64	60
2017	1647	33	951	1564.96	630	2260.5	33
2018	1646	33	979	1373.96	600	2999.93	34
2019	1643	34	964	709.88	615	1601.88	30
2020	1643	31	949	788.97	637	1861.38	30
2021	1644	34	903	927.17	678	2473.21	29
2022	1644	34	794	741.99	787	3681.72	29
2023	1645	31	826	582.02	748	5039.9	32
2024	1646	30	894	614.36	690	5956.56	31

Source: Compiled from Economic Review (2015-24), State Planning Board, Kerala

Annexure II

List of Sample PACS

Profit-Making PACS

Sl No	Name	Reg No.	Taluk and District
1	Madhur Service Co-operative Bank Limited	C3372	Kasaragod Taluk - Kasaragod District
2	Chuzhali Service Co-operative Bank Ltd.	LL 134	Taliparamba Taluk - Kannur District
3	Kommeri Service Co-operative Bank Limited	D 2022	Kozhikode Taluk - Kozhikode District
4	Purameri Service Co-operative Bank Limited	F1271	Vatakara Taluk - Kozhikode District
5	Villiappally Panchayath Service Cooperative Bank Ltd	D 2342	Vatakara Taluk - Kozhikode District
6	Kalpakkancheri Service Co-operative Bank Ltd	1808	Tirur Taluk - Malappuram District
7	Triprangode Service Co-operative Bank Ltd	1890	Tirur Taluk - Malappuram District
8	Vallikkunnu Service Cooperative Bank Ltd	M4	Tirurangadi - Taluk Malappuram District
9	Pang Service Cooperative Bank Ltd	1410	Perinthalmanna - Taluk Malappuram District
10	Elamkulam Service Cooperative Bank Ltd	1536F	Perinthalmanna - Taluk Malappuram District
11	Punnappala Service Cooperative Bank Ltd	F928	Nilambur Taluk - Malappuram District
12	Kattappana Service Co-operative Bank	3738	Idukki Taluk - Idukki District
13	Pallippurar Service Co-operative Society Ltd	1308	Cherthala Taluk - Alappuzha District

Loss-Making PACS

Sl No	Name	Reg No.	Taluk and District
1	Arattupuzha Service Cooperative Bank Ltd	195	Karthikappally Taluk - Alappuzha District
2	Kappumthala Service Co-operative Bank Ltd	K 142	Vaikom Taluk - Kottayam District
3	Pottankadu Service Cooperative Bank	K165	Udumbanchola Taluk - Idukki District
4	Kodumbu Service Co-operative Bank Ltd No P 1412	P 1412	Palakkad Taluk - Palakkad District
5	Kuzhimanna Service Co-Operative Bank Ltd	D 1899	Kondotty Taluk - Malappuram District
6	Kavumthara Service Cooperative Bank Ltd	D 3205	Koyilandy Taluk - Kozhikode District

7	Padinnarathara Service Co-operative Bank	F 1664	Vythiri Taluk - Wayanad District
8	Periya Service Cooperative Bank	W.284	Mananthavady Taluk - Wayanad District
9	Anjukunnu Service Cooperative Ebank Ltd	C311	Mananthavady Taluk - Wayanad District
10	Vellamunda Service Cooperative Bank Ltd	C 530	Mananthavady Taluk - Wayanad District
11	Kunnirikka Service Co Op. Bank Ltd	6971	Thalassery Taluk - Kannur District
12	Pathiriyad Service Co Op Bank Ltd No-F 1465	F 1465	Thalassery Taluk - Kannur District
13	Muzhappilangad Service Co-Op Bank Ltd.	F1756	Kannur Taluk - Kannur District
14	Iriveri Service Co-Op Bank Ltd.	F6861	Kannur Taluk - Kannur District
15	Kolakkad Service Co-Operative Bank Ltd No C 277	C 277	Iritty Taluk - Kannur District
16	Perumbala Service Cooperative Bank Limited	Ff59	Kasaragod Taluk - Kasaragod District
17	Kondazy Service Co-op Bank	678	Thalappilly Taluk - Thrissur District
18	Cherthala Service Co-Operative Bank Ltd	1688	Cherthala Taluk - Alappuzha District
19	Kanthalloor Service Co-Operative Bank Ltd	K.341	Devikulam Taluk - Idukki District
20	Muthuvalloor Service Co-operative Bank Ltd	M 839	Kondotty Taluk - Malappuram District
21	Muttathody Service Co-operative Bank Limited	C.336	Kasaragod Taluk - Kasaragod District
22	Mugu Service Co-operative Bank Ltd	C 33(FF)	Manjeswar Taluk - Kasaragod District
23	Katukukke Service Co-operative Bank Ltd	C 97	Manjeswar Taluk - Kasaragod District

Annexure III Indicator Panel for GLOSP Dimensions

PACS_Code	Year	Category	Members	Paidup_ Share_ Capital	Reserve_ Funds	Total_ Deposits	Total_ Borrowings	Interest_ Burden	Total_ Loans_to _ Members	Outstanding _Loans	Misc_ Income	Establishm ent _Expenses	Continge ncies	Movables_ Immovables
101	2020-2021	Loss PACS	2701	48.02	0.118103	1475	370	134	1578	1056	22.98	54.89	7.04	18.36
101	2021-2022	Loss PACS	2714	48.66	0.121036	1529	320	142.8	1724	1104	23.97	69.26	7.08	18.62
101	2022-2023	Loss PACS	2729	49.07	0.121036	1569	264	143	1752	1124	23.24	22.77	8.49	18.62
101	2023-2024	Loss PACS	2755	50.82	0.121036	1573	201	155	1800	1148	26.85	15.44	9.16	18.62
101	2024-2025	Loss PACS	2941	52.08	0.121036	1625	151	163	1795	1124	24.28	20.38	12.51	18.62
102	2020-2021	Loss PACS	2499	61.35	2.33	1704	2158	769	3614	2989	5.8	47.57	58	186
102	2021-2022	Loss PACS	2496	61.3	2.33	1607	2259	855	3256	2681	5.6	46.72	48	186
102	2022-2023	Loss PACS	2487	59.42	2.33	1487	2258	1082	2840	2491	3.83	41.7	54.91	186
102	2023-2024	Loss PACS	2478	56.82	2.33	1306	2257	1403	2584	2179	3.66	38.99	8.9	186
102	2024-2025	Loss PACS	2475	55.68	2.33	1250	2257	2174	2229	2057	4.64	41.6	9.03	186
103	2020-2021	Loss PACS	6045	62.17	19.14	3018	411	209	6254	2522	17.54	101	54.18	157
103	2021-2022	Loss PACS	6338	69.38	19.14	3350	433	221	6427	2797	18.57	106	59.38	181
103	2022-2023	Loss PACS	6639	76.22	19.14	3594	650	244	8287	3140	21.98	143	68.55	168
103	2023-2024	Loss PACS	6821	88.96	19.14	3829	945	298	10248	3595	17.25	122	62.78	238
103	2024-2025	Loss PACS	6991	97.59	19.14	4609	778	341	12194	4140	30.1	134	72.29	242
104	2020-2021	Loss PACS	1196	6.99	0.084	401	0	24.66	96.05	61.04	12.55	0.94215	10.02	16.47
104	2021-2022	Loss PACS	1198	7.04	0.08066	414	0	25.29	119	71.75	13.96	0.97	11.1	17.14
104	2022-2023	Loss PACS	3297	8.19	0.08662	635	0	36.33	138	78.66	32.46	4.86	8.67	18.17
104	2023-2024	Loss PACS	3254	10.02	0.0998	607	0	56.37	291	143	39.32	6.46	9.03	18.17
104	2024-2025	Loss PACS	3278	13.16	0.10157	699	0	60.06	529	248	36.57	7.36	9.11	20.79
105	2020-2021	Loss PACS	10747	117	14.45	2454	0	332	2987	2236	74.79	57.84	66.74	65.67
105	2021-2022	Loss PACS	10896	117	14.45	2541	0	357	3195	2227	85.94	65.42	70.15	66.27
105	2022-2023	Loss PACS	10926	117	14.45	2619	0	337	3526	2446	95.16	129	99.09	67.17
105	2023-2024	Loss PACS	11012	117	14.45	2365	0	358	3481	2285	106	54.8	101	73.37
105	2024-2025	Loss PACS	10615	115	14.45	2286	0	347	3314	1995	86.13	69.46	76.15	76.28
106	2020-2021	Loss PACS	4562	35.87	21.87	897	1084	147	1467	1138	10.17	44.1	24.56	14.74
106	2021-2022	Loss PACS	4763	41.72	22.81	927	1113	122	2014	1203	10.84	44.64	26	15.19
106	2022-2023	Loss PACS	6167	33.54	22.81	1029	1084	143	2308	1174	11.97	59.41	30.19	15.32
106	2023-2024	Loss PACS	4801	34.28	22.81	1087	899	147	2162	1144	17.11	34.82	25.88	15.32
106	2024-2025	Loss PACS	4806	34.53	22.81	1273	905	164	2342	1176	10.95	53.69	21.61	16.19
107	2020-2021	Loss PACS	6514	68.41	6.87	3578	3.5	363	5347	2674	75.47	74.58	34.57	74.41
107	2021-2022	Loss PACS	6904	72.19	7.92	3907	3.5	394	5677	2759	77.72	77.71	39.47	74.43
107	2022-2023	Loss PACS	6932	75	7.92	4137	3	357	6378	2846	66.11	62.5	48.66	74.45
107	2023-2024	Loss PACS	5860	81.64	7.95	4062	2.5	393	6959	3131	72.49	92.09	56.16	74.53
107	2024-2025	Loss PACS	5875	83.51	7.95	4081	588	487	7941	3442	88.62	88.16	44.21	74.53
108	2020-2021	Loss PACS	4578	59.87	71.24	4974	100	415	8474	3268	114	120	51.04	312
108	2021-2022	Loss PACS	4958	61.16	73.85	5153	100	350	8552	3622	120	130	52.71	333
108	2022-2023	Loss PACS	5042	66.99	73.85	5559	100	482	9079	3674	144	109	40.77	386
108	2023-2024	Loss PACS	5098	71.19	73.85	5987	0	506	10149	4140	163	104	32.03	390
108	2024-2025	Loss PACS	5144	73.67	73.85	6087	200	599	12224	5083	164	139	41.95	391
109	2020-2021	Loss PACS	4115	34.15	0	918	897	165	2295	1281	17.41	28.79	9.71	31.97
109	2021-2022	Loss PACS	4362	36.53	0	819	977	166	2000	1091	18.24	29.49	9.81	31.97
109	2022-2023	Loss PACS	4362	36.31	0.0565	550	1022	119	1525	887	12.67	22.96	11.41	31.97
109	2023-2024	Loss PACS	4424	36.11	0.062266	457	1065	131	1313	769	10.99	19.61	8.63	31.97
109	2024-2025	Loss PACS	4421	35.78	0.0565	335	1151	117	1086	657	10.27	10.89	8.6	31.97
110	2020-2021	Loss PACS	17044	91.14	0.113474	6410	147	571	9164	4661	87.47	78.74	64.78	374
110	2021-2022	Loss PACS	17044	90.35	0.113691	6195	150	610	9079	4640	83.42	87.84	66.38	338
110	2022-2023	Loss PACS	17394	92.65	0.113611	6460	0	650	9165	4507	119	98.8	67.32	339
110	2023-2024	Loss PACS	7802	93.73	0.113691	6456	0	740	9738	4578	168	79.3	60.79	341
110	2024-2025	Loss PACS	17899	93.72	0.113691	5955	430	720	10747	4780	102	71	58.21	328
111	2020-2021	Loss PACS	38978	64.57	7.67	6475	74.87	479	7141	3852	41.77	171	74.17	142
111	2021-2022	Loss PACS	39380	67.69	7.67	5886	45.79	495	7812	4051	42.51	172	75.31	130
111	2022-2023	Loss PACS	39868	73.17	7.67	5900	100	517	7941	4025	39.35	117	69.59	117
111	2023-2024	Loss PACS	40285	77.54	7.67	5955	99.97	584	7958	4063	43.83	114	71.36	117
111	2024-2025	Loss PACS	40868	78.54	7.67	6009	98.98	621	8157	3963	37.59	107	66.02	121
112	2020-2021	Loss PACS	16171	74.74	0.350508	3241	74.78	257	6741	2860	44.17	78.97	41.32	57.41
112	2021-2022	Loss PACS	16171	77.84	0.350508	3300	84.53	291	6767	2637	46.04	109	41.82	57.19
112	2022-2023	Loss PACS	3444	78.48	0.350508	3497	39.64	288	7040	2669	57.48	74.38	43.69	58.59
112	2023-2024	Loss PACS	3451	76.78	0.350508	3638	43.21	341	7773	3018	63.87	76.8	40.77	59.04
112	2024-2025	Loss PACS	3453	75.71	0.350508	3950	42.94	377	9167	3191	64.81	88.21	44.08	59.28
113	2020-2021	Loss PACS	3254	91.47	7.94	4187	271	356	5687	3277	33.21	74.18	34.76	212
113	2021-2022	Loss PACS	3266	93.19	7.94	4196	281	376	6452	3653	35.33	79.13	36.75	215
113	2022-2023	Loss PACS	3383	101	7.94	4852	103	395	7289	4008	43.17	105	45.82	218
113	2023-2024	Loss PACS	3476	108	7.94	5444	126	491	8578	4704	64.78	96.21	48.4	219
113	2024-2025	Loss PACS	3546	112	7.94	5655	142	594	9900	4815	55.52	100	51.25	220
114	2020-2021	Loss PACS	10978	55.41	0.03412	1284	1197	215	3548	1901	20.14	40.14	27.71	64.51
114	2021-2022	Loss PACS	11907	56.71	0.038677	1273	1194	265	3697	1850	20.67	42.83	27.23	66.46
114	2022-2023	Loss PACS	13123	58.53	0.038677	1245	1253	172	3444	1782	19.85	30.12	19.62	66.46
114	2023-2024	Loss PACS	12960	57.4	0.038677	1162	1301	328	3351	1650	17.71	30.9	28.25	69.46
114	2024-2025	Loss PACS	13175	56.25	0.430877	1300	1236	295	3247	1557	19.48	37.98	61.05	69.46
115	2020-2021	Loss PACS	3475	33.14	0.004977	1014	514	121	1574	715	32.18	25.84	19.78	22.17
115	2021-2022	Loss PACS	3472	33.04	0.004977	1038	542	133	1787	795	35.27	28.81	19.88	22.18
115	2022-2023	Loss PACS	5714	30.72	0.004977	1070	568	125	1965	834	24.98	39.63	19.78	22.7
115	2023-2024	Loss PACS	3484	27.84	0.004977	1078	420	113	1786	746	32.05	21.32	24.39	24.47
115	2024-2025	Loss PACS	3488	28.42	0.004537	1193	403	131	2028	780	28.57	26.03	17.49	24.65
116	2020-2021	Loss PACS	4785	59.64	1.27	1110	1719	237	4748	2166	19.74	33.41	32.14	110
116	2021-2022	Loss PACS	4985	58.65	1.37	1111	1898	248	5038	2341	20.03	34.15	35.92	110
116	2022-2023	Loss PACS	2048	59.08	1.6	1117	1950	253	5088	2292	15.52	26.17	26.5	111
116	2023-2024	Loss PACS	5223	57.44	1.6	1126	2057	273	4613	2111	19.93	28.66	34.74	154
116	2024-2025	Loss PACS	5347	58.03	1.6	1277	2255	298	4282	1991	17.41	29.44	22.25	154
117	2020-2021	Loss PACS	7437	57.48	0.02345	1437	2184	247	4376	2344	32.74	14.17	25.47	34.58
117	2021-2022	Loss PACS	7588	58.93	0.022255	1438	2190	284	4450	2238	31.93	14.67	27.25	35.96
117	2022-2023	Loss PACS	4366	57.93	0.047688	1376	2154	263	4547	2088	16.01	19.21	28.87	38.11
117	2023-2024	Loss PACS	7683	57.3	0.047688	1355	2223	297	4045	1861	21.76	10.62	27.35	38.72
117	2024-2025	Loss PACS	7733	57.23	0.222505	13107	2117	299	3802	1680	8.66	6.48	28.07	38.93
118	2020-2021	Loss PACS	714	25.64	0.00931	624	101	31.11	951	459	7.41	5.71	18.75	14.14
118	2021-2022	Loss PACS	721	25.65	0.00931	644	104	31.78	1052	564	7.42	5.77	19.1	14.69
118	2022-2023	Loss PACS	793	28.9	0.00931	932	41.6	46.44	1211	645	7.09	8.13	14.91	14.69
118	2023-2024	Loss PACS	853	30.04	0.00931	913	72.96	65.37	1468	722	15.35	11.98	14.32	15.01
118	2024-2025	Loss PACS	869	31.76	0.00931	968	161	78.84	1712	803	15.37	12.22	13.37	15.04

PACS_Code	Year	Category	Cash_ at_Bank	Investments _Valuation	Gross_ Profit _Loss	Net _Profit _Loss	Working _Capital	Prev_ Members	Prev_ Total_ Deposits	Prev_ Total_ Borrowings	Prev_ Outstanding _Loans	Prev_Net _Profit _Loss	Estimated _Interest _Income
101	2020-2021	Loss PACS	397	0	0.02456	-324	1893						126.72
101	2021-2022	Loss PACS	431	0	0.1435	-353	1893	2701	1475	370	1056	-324	132.48
101	2022-2023	Loss PACS	381	0	0.25315	-371	1898	2714	1529	320	1104	-353	134.88
101	2023-2024	Loss PACS	292	0	0.422099	-404	1841	2729	1569	264	1124	-371	137.76
101	2024-2025	Loss PACS	316	0	0.409663	-407	1844	2755	1573	201	1148	-404	134.88
102	2020-2021	Loss PACS	1.88	0	0	-4262	3927						358.68
102	2021-2022	Loss PACS	1.77	0	0	-4303	3941	2499	1704	2158	2989	-4262	321.72
102	2022-2023	Loss PACS	1.27	0	0	-4536	3709	2496	1607	2259	2681	-4303	298.92
102	2023-2024	Loss PACS	6.5	0	0	-4935	3532	2487	1487	2258	2491	-4536	261.48
102	2024-2025	Loss PACS	1.25	0	0	-5331	3474	2478	1306	2257	2179	-4935	246.84
103	2020-2021	Loss PACS	350	0	0	-955	3491						302.64
103	2021-2022	Loss PACS	370	0	0	-1066	3801	6045	3018	411	2522	-955	335.64
103	2022-2023	Loss PACS	350	0	0.186767	-1130	4257	6338	3350	433	2797	-1066	376.8
103	2023-2024	Loss PACS	315	0	0	-1246	4757	6639	3594	650	3140	-1130	431.4
103	2024-2025	Loss PACS	232	0	0	-1306	5380	6821	3829	945	3595	-1246	496.8
104	2020-2021	Loss PACS	182	0	-0.02532	-21.66	471						7.3248
104	2021-2022	Loss PACS	302	0	0.028175	-32.51	405	1196	401	0	61.04	-21.66	8.61
104	2022-2023	Loss PACS	491	0	-0.04679	-47.51	633	1198	414	0	71.75	-32.51	9.4392
104	2023-2024	Loss PACS	405	0	0	-56.53	607	3297	635	0	78.66	-47.51	17.16
104	2024-2025	Loss PACS	398	0	0.19049	-60.38	701	3254	607	0	143	-56.53	29.76
105	2020-2021	Loss PACS	978	0	-3.14	-17.33	2572						268.32
105	2021-2022	Loss PACS	895	0	5.32	-36.16	2729	10747	2454	0	2236	-17.33	267.24
105	2022-2023	Loss PACS	733	0	-4.7	-204	2809	10896	2541	0	2227	-36.16	293.52
105	2023-2024	Loss PACS	577	0	19.15	-277	2550	10926	2619	0	2446	-204	274.2
105	2024-2025	Loss PACS	710	0	13.65	-673	2463	11012	2365	0	2285	-277	239.4
106	2020-2021	Loss PACS	187	0	0.09874	-613	2021						136.56
106	2021-2022	Loss PACS	191	0	0.112331	-744	1967	4562	897	1084	1138	-613	144.36
106	2022-2023	Loss PACS	260	0	-0.21016	-841	2053	4763	927	1113	1203	-744	140.88
106	2023-2024	Loss PACS	102	0	0.155749	-973	1930	6167	1029	1084	1174	-841	137.28
106	2024-2025	Loss PACS	79.59	0	0.077571	-983	2114	4801	1087	899	1144	-973	141.12
107	2020-2021	Loss PACS	74.58	34.57	74.41	-246	3845						320.88
107	2021-2022	Loss PACS	77.71	39.47	74.43	-385	3967	6514	3578	3.5	2674	-246	331.08
107	2022-2023	Loss PACS	62.5	48.66	74.45	-553	4205	6904	3907	3.5	2759	-385	341.52
107	2023-2024	Loss PACS	92.09	56.16	74.53	-656	4144	6932	4137	3	2846	-553	375.72
107	2024-2025	Loss PACS	88.16	44.21	74.53	-673	4739	5860	4062	2.5	3131	-656	413.04
108	2020-2021	Loss PACS	1474	0	-0.47897	-195	5124						392.16
108	2021-2022	Loss PACS	1584	0	-0.57213	-251	5046	4578	4974	100	3268	-195	434.64
108	2022-2023	Loss PACS	1931	0	3.83	-371	5354	4958	5153	100	3622	-251	440.88
108	2023-2024	Loss PACS	1782	0	-0.65104	-412	5806	5042	5559	100	3674	-371	496.8
108	2024-2025	Loss PACS	975	0	-1.26	-456	6113	5098	5987	0	4140	-412	609.96
109	2020-2021	Loss PACS	67.47	27.74	0.34715	-730	1854						153.72
109	2021-2022	Loss PACS	64.84	27.14	0.227899	-733	1822	4115	918	897	1281	-730	130.92
109	2022-2023	Loss PACS	19.83	27.14	0	-893	1598	4362	819	977	1091	-733	106.44
109	2023-2024	Loss PACS	2.65	24.85	0	-1006	1549	4362	550	1022	887	-893	92.28
109	2024-2025	Loss PACS	7.66	24.85	0	-1100	1514	4424	457	1065	769	-1006	78.84
110	2020-2021	Loss PACS	1747	14.71	1.74	-364	6645						559.32
110	2021-2022	Loss PACS	1274	15.91	1.83	-458	6145	17044	6410	147	4661	-364	556.8
110	2022-2023	Loss PACS	1513	15.42	-0.74475	-670	6214	17044	6195	150	4640	-458	540.84
110	2023-2024	Loss PACS	1489	15.42	0.370845	-1236	6264	17394	6460	0	4507	-670	549.36
110	2024-2025	Loss PACS	1031	15.42	0.541559	-1324	6196	7802	6456	0	4578	-1236	573.6
111	2020-2021	Loss PACS	521	41.47	-5.41	-1145	6601						462.24
111	2021-2022	Loss PACS	530	40.7	-5.75	-1400	5980	38978	6475	74.87	3852	-1145	486.12
111	2022-2023	Loss PACS	473	11.07	-8.13	-1694	6042	39380	5886	45.79	4051	-1400	483
111	2023-2024	Loss PACS	311	40.91	-3.29	-1989	6137	39868	5900	100	4025	-1694	487.56
111	2024-2025	Loss PACS	302	40.66	-7.48	-2272	6197	40285	5955	99.97	4063	-1989	475.56
112	2020-2021	Loss PACS	714	0	1.84	-93.45	3401						343.2
112	2021-2022	Loss PACS	707	0	1.93	-138	3451	16171	3241	74.78	2860	-93.45	316.44
112	2022-2023	Loss PACS	838	0	0.682416	-180	3614	16171	3300	84.53	2637	-138	320.28
112	2023-2024	Loss PACS	620	0	0.651333	-393	3750	3444	3497	39.64	2669	-180	362.16
112	2024-2025	Loss PACS	744	0	0.879216	-439	4062	3451	3638	43.21	3018	-393	382.92
113	2020-2021	Loss PACS	548	0	0.24767	-137	4569						393.24
113	2021-2022	Loss PACS	587	0	0.20662	-227	4377	3254	4187	271	3277	-137	438.36
113	2022-2023	Loss PACS	644	0	3.04	-308	4867	3266	4196	281	3653	-227	480.96
113	2023-2024	Loss PACS	580	0	4.06	-417	5495	3383	4852	103	4008	-308	564.48
113	2024-2025	Loss PACS	632	0	-1.49	-598	5725	3476	5444	126	4704	-417	577.8
114	2020-2021	Loss PACS	174	0	-0.07748	-499	2471						228.12
114	2021-2022	Loss PACS	186	0	8.32	-567	2513	10978	1284	1197	1901	-499	222
114	2022-2023	Loss PACS	174	0	-3.36	-616	2549	11907	1273	1194	1850	-567	213.84
114	2023-2024	Loss PACS	166	0	-0.34166	-757	2510	13123	1245	1253	1782	-616	198
114	2024-2025	Loss PACS	216	0	-2.58	-854	2582	12960	1162	1301	1650	-757	186.84
115	2020-2021	Loss PACS	347	0	0.32341	-390	1565						85.8
115	2021-2022	Loss PACS	331	0	0.354695	-443	1611	3475	1014	514	715	-390	95.4
115	2022-2023	Loss PACS	290	0	0.13195	-464	1667	3472	1038	542	795	-443	100.08
115	2023-2024	Loss PACS	177	0	0.00567	-525	1523	5714	1070	568	834	-464	89.52
115	2024-2025	Loss PACS	220	0	0	-546	1623	3484	1078	420	746	-525	93.6
116	2020-2021	Loss PACS	96.87	0	1.23	-214	2879						259.92
116	2021-2022	Loss PACS	98.98	0	3.49	-262	3012	4785	1110	1719	2166	-214	280.92
116	2022-2023	Loss PACS	90.12	0	0.899056	-293	3074	4985	1111	1898	2341	-262	275.04
116	2023-2024	Loss PACS	71.17	0	8.02	-334	3158	2048	1117	1950	2292	-293	253.32
116	2024-2025	Loss PACS	114	0	11.32	-374	3276	5223	1126	2057	2111	-334	238.92
117	2020-2021	Loss PACS	254	0	-0.16374	-1239	3654						281.28
117	2021-2022	Loss PACS	251	0	-0.32852	-1468	3665	7437	1437	2184	2344	-1239	268.56
117	2022-2023	Loss PACS	152	0	0.14302	-1692	3567	7588	1438	2190	2238	-1468	250.56
117	2023-2024	Loss PACS	343	0	0	-1862	3617	4366	1376	2154	2088	-1692	223.32
117	2024-2025	Loss PACS	171	0	0	-1951	3470	7683	1355	2223	1861	-1862	201.6
118	2020-2021	Loss PACS	174	0	-0.07485	-30.92	754						55.08
118	2021-2022	Loss PACS	185	0	0.670605	-50.84	770	714	624	101	459	-30.92	67.68
118	2022-2023	Loss PACS	243	0	-0.35389	-52.88	957	721	644	104	564	-50.84	77.4
118	2023-2024	Loss PACS	247	0	-0.08554	-60.03	1010	793	932	41.6	645	-52.88	86.64
118	2024-2025	Loss PACS	310	0	0.239911	-62.19	1158	853	913	72.96	722	-60.03	96.36

PACS_Code	Year	Category	Members	Paidup_ Share_ Capital	Reserve_ Funds	Total_ Deposits	Total_ Borrowings	Interest_ Burden	Total_ Loans_to _ Members	Outstanding _Loans	Misc_ Income	Establishm ent _Expenses	Continge ncies	Movables_ Immovables
119	2020-2021	Loss PACS	2745	30.64	1.03	1114	410	85.14	2104	1011	12.47	30.12	34.54	32.03
119	2021-2022	Loss PACS	2866	31.59	1.03	1113	440	87.79	2100	935	13.17	30.97	37.65	32.03
119	2022-2023	Loss PACS	2865	31.27	1.03	1118	389	80.98	2058	854	22.6	24.16	33.96	32.03
119	2023-2024	Loss PACS	2937	31.06	1.03	1203	329	87.5	1910	819	21.06	13.13	34.09	32.03
119	2024-2025	Loss PACS	2931	30.85	1.03	1185	302	94.07	1921	796	19.05	19.56	38.28	32.58
120	2020-2021	Loss PACS	1454	10.57	0.03214	274	0	21.41	274	116	5.41	2.74	4.97	1.11
120	2021-2022	Loss PACS	1458	10.79	0.03369	293	0	23.6	300	154	5.88	2.83	6.84	1.1
120	2022-2023	Loss PACS	1461	11.65	0.03369	318	0	26.94	383	191	6.35	1.74	4.92	1.46
120	2023-2024	Loss PACS	1979	12.4	0.08987	283	0	29.43	344	200	6.34	5.16	4.43	1.46
120	2024-2025	Loss PACS	1462	13.01	0.08987	308	0	32.19	346	223	5.39	6.59	5.57	1.46
121	2020-2021	Loss PACS	12314	55.69	0.516487	2672	874	210	4574	2320	41.87	124	48.97	123
121	2021-2022	Loss PACS	12441	56.93	0.656557	2760	888	205	5031	2608	44.05	145	49.05	124
121	2022-2023	Loss PACS	12432	56.52	0.656557	2724	941	243	5158	2563	36.68	107	152	139
121	2023-2024	Loss PACS	12558	56.15	0.726987	2454	1083	254	4678	2308	38.06	109	41.8	44.98
121	2024-2025	Loss PACS	11415	51.85	0.656557	2304	1169	244	5159	2427	34.96	128	41.9	142
122	2020-2021	Loss PACS	6724	53.14	0.875476	2704	1154	378	3674	1678	174	12.12	34.14	22.25
122	2021-2022	Loss PACS	6738	53.12	0.89533	2705	1154	391	3639	1631	184	12.29	34.16	22.25
122	2022-2023	Loss PACS	7199	53.57	0.89533	2596	1150	364	3931	1655	188	22.57	50.67	22.25
122	2023-2024	Loss PACS	7248	56.1	0.89533	2314	1257	366	4164	1672	182	163	28.03	23.44
122	2024-2025	Loss PACS	7289	54.81	0.89533	2230	1368	380	4122	1678	186	82.87	35.05	23.74
123	2020-2021	Loss PACS	3347	21.14	0.008985	217	471	57.14	614	456	1.14	7.04	10.87	6.69
123	2021-2022	Loss PACS	3370	22.82	0.008985	235	503	57.81	736	499	1.39	7.72	11.28	6.69
123	2022-2023	Loss PACS	4064	23.32	0.008985	735	447	68.26	715	452	3.79	6.21	18.83	6.69
123	2023-2024	Loss PACS	4127	22.2	0.008985	235	365	59.95	564	349	2.66	6.4	14.16	6.69
123	2024-2025	Loss PACS	4158	20.03	0.008985	326	403	57.86	600	395	3.34	6.61	9.26	6.69
201	2020-2021	Profit PACS	2666	56.08	13.68	2752	160	230	4503	2394	44.99	36.1	2085	33.97
201	2021-2022	Profit PACS	2751	65.74	15.53	3062	196	247	4686	2503	64.11	33.04	28.38	35.37
201	2022-2023	Profit PACS	2845	78.05	19.24	3685	95.62	286	5291	2716	85.34	39.42	35.52	36.22
201	2023-2024	Profit PACS	3043	119	23.44	3935	134	362	5890	3129	132	43.56	24.94	40.63
201	2024-2025	Profit PACS	3116	138	28.68	4456	107	420	7096	3770	123	52.31	29.41	41.71
202	2020-2021	Profit PACS	12832	104	21.66	5258	242	442	7458	4040	139	112	32.46	117
202	2021-2022	Profit PACS	13433	114	24.69	5888	342	458	8590	4400	168	111	41.77	119
202	2022-2023	Profit PACS	14012	127	29.09	6129	330	494	9606	4834	207	114	37.85	126
202	2023-2024	Profit PACS	14425	139	34.3	6343	350	592	10758	5540	239	130	44.28	127
202	2024-2025	Profit PACS	14899	146	41.21	7196	350	684	12141	5891	258	136	45.7	132
203	2020-2021	Profit PACS	7838	229	50.98	12133	365	1391	15097	8869	260	80.63	109	61.27
203	2021-2022	Profit PACS	7839	247	47.91	12965	1040	1397	17334	10274	379	108	1.23	1.12
203	2022-2023	Profit PACS	7827	264	55.3	13722	792	1386	20232	10624	320	125	137	66.3
203	2023-2024	Profit PACS	4423	275	56.29	14024	798	1439	22372	11358	356	155	157	66.3
203	2024-2025	Profit PACS	15402	285	56.29	14807	1493	1706	25525	11824	367	165	152	95.1
204	2020-2021	Profit PACS	17293	192	166	13945	93.93	1942	23570	11768	439	312	105	158
204	2021-2022	Profit PACS	17382	189	167	17668	200	1965	26965	12137	476	490	122	161
204	2022-2023	Profit PACS	17461	196	168	19315	202	2025	33532	13771	500	337	136	230
204	2023-2024	Profit PACS	18082	199	173	19799	192	2130	37397	15786	530	344	129	234
204	2024-2025	Profit PACS	18184	202	182	21085	0	2493	44142	16024	483	386	135	237
205	2020-2021	Profit PACS	3823	160	221	10606	594	1075	16067	7959	347	110	80.35	117
205	2021-2022	Profit PACS	3799	163	228	11652	1164	1183	18633	8889	421	176	73.34	117
205	2022-2023	Profit PACS	3633	167	235	13074	698	1291	21457	10283	394	143	99.59	147
205	2023-2024	Profit PACS	3602	176	247	13849	723	1371	25855	11666	457	137	110	152
205	2024-2025	Profit PACS	3576	192	261	15245	774	1633	33252	13963	450	161	124	192
206	2020-2021	Profit PACS	4850	60.28	146	2101	0	145	1628	977	113	59.46	32.54	22.87
206	2021-2022	Profit PACS	8420	63.24	153	2416	0	112	1891	1063	116	55.93	34.49	23.45
206	2022-2023	Profit PACS	8817	67.61	160	2708	0	126	2297	1212	132	50.32	44.54	24.01
206	2023-2024	Profit PACS	9220	73.55	172	2802	0	154	2434	1362	175	57.72	49.8	40.06
206	2024-2025	Profit PACS	5209	77.98	184	3239	0	178	2585	1423	188	70.58	49.23	40.98
207	2020-2021	Profit PACS	6703	53.86	43.95	4287	0	362	6450	3446	91.59	76.9	33.51	44.73
207	2021-2022	Profit PACS	23943	66.47	45.88	5091	0	380	7884	4112	66.79	59.79	40.61	45.17
207	2022-2023	Profit PACS	24558	82.47	48.76	5709	101	410	10063	4948	156	63.91	52.16	49.4
207	2023-2024	Profit PACS	25165	97.44	66.31	6513	20.99	483	10988	5523	130	81.28	65.53	62.33
207	2024-2025	Profit PACS	25781	109	77.33	6610	170	561	11844	5922	214	85.13	67.88	63.91
208	2020-2021	Profit PACS	7634	146	26.7	5593	819	559	11743	5431	127	112	37.18	63.82
208	2021-2022	Profit PACS	7779	150	29.31	6090	977	537	13202	5740	129	115	47.64	65.16
208	2022-2023	Profit PACS	9495	166	34.84	6775	977	603	14488	6133	155	115	69.41	74.19
208	2023-2024	Profit PACS	9840	169	40.76	7802	1083	695	16617	7289	229	116	70.82	79.88
208	2024-2025	Profit PACS	10181	196	47.12	8995	1070	897	20890	8533	237	160	72.94	80.93
209	2020-2021	Profit PACS	18700	62.49	52.89	7311	500	535	16008	5154	261	187	53.35	132
209	2021-2022	Profit PACS	19145	70.01	56.46	7606	500	527	17918	5940	212	183	65.37	148
209	2022-2023	Profit PACS	19573	82.17	60.41	9079	650	559	20025	6721	233	185	88.02	221
209	2023-2024	Profit PACS	20009	92.42	64.67	9391	628	651	22747	7905	273	194	75.31	223
209	2024-2025	Profit PACS	20340	114	69.22	10239	700	733	28255	8882	227	174	85.05	225
210	2020-2021	Profit PACS	22988	186	131	12113	0	1131	14633	6526	517	232	67.61	116
210	2021-2022	Profit PACS	23170	189	137	12906	0	1102	16066	6937	512	254	75.72	125
210	2022-2023	Profit PACS	23638	196	145	13302	0	1166	17050	7016	591	195	70.34	210
210	2023-2024	Profit PACS	24736	201	153	13670	0	1260	17486	7366	651	166	78.24	213
210	2024-2025	Profit PACS	25262	208	165	14244	0	1319	18713	7882	706	186	97.3	217
211	2020-2021	Profit PACS	12933	95	23.95	5348	0	459	7834	3552	141	71.08	36.53	74.99
211	2021-2022	Profit PACS	13176	104	24.11	5878	0	476	8295	3901	147	131	46.32	76.2
211	2022-2023	Profit PACS	13377	109	24.37	7171	0	530	8893	3912	188	106	37.35	76.53
211	2023-2024	Profit PACS	13630	116	25.76	7588	0	659	9377	4148	298	116	48.07	78.26
211	2024-2025	Profit PACS	13953	120	28.97	7939	0	708	10438	4754	336	134	56.38	78.26
212	2020-2021	Profit PACS	15486	545	141	19148	2872	2380	50138	23565	220	120	324	374
212	2021-2022	Profit PACS	21185	545	151	19978	6919	2730	50720	23896	311	211	475	388
212	2022-2023	Profit PACS	21948	649	176	17369	4198	2622	56645	24639	201	220	472	428
212	2023-2024	Profit PACS	22830	675	202	17305	5559	2641	56327	26103	167	212	536	455
212	2024-2025	Profit PACS	16509	674	230	18584	4080	2707	57193	26914	136	213	525	462
213	2020-2021	Profit PACS	3415	84.06	2.49	3028	102	280	4150	2613	132	28.75	31.08	77.51
213	2021-2022	Profit PACS	3421	82.72	2.53	3226	217	284	4606	2707	152	32.14	30.65	77.68
213	2022-2023	Profit PACS	3443	83.08	3.31	3469	82.76	320	4767	2705	197	32.19	23.59	78.04
213	2023-2024	Profit PACS	3467	81.03	4.51	3674	31.3	445	4821	2825	206	35.82	28.7	78.33
213	2024-2025	Profit PACS	3604	80.2	6.23	3833	28.14	424	5203	2911	259	43.83	61.1	78.86

PACS_Code	Year	Category	Cash_ at_Bank	Investments _Valuation	Gross_ Profit _Loss	Net _Profit _Loss	Working _Capital	Prev_ Members	Prev_ Total_ Deposits	Prev_ Total_ Borrowings	Prev_ Outstanding _Loans	Prev_Net _Profit _Loss	Estimated _Interest _Income
119	2020-2021	Loss PACS	244	0	-0.14785	-245	1547						121.32
119	2021-2022	Loss PACS	245	0	-0.15405	-279	1568	2745	1114	410	1011	-245	112.2
119	2022-2023	Loss PACS	244	0	0	-296	1525	2866	1113	440	935	-279	102.48
119	2023-2024	Loss PACS	283	0	0	-358	1568	2865	1118	389	854	-296	98.28
119	2024-2025	Loss PACS	233	0	0	-417	1522	2937	1203	329	819	-358	95.52
120	2020-2021	Loss PACS	113	0	0	-36.45	286						13.92
120	2021-2022	Loss PACS	114	0	0	-39.56	301	1454	274	0	116	-36.45	18.48
120	2022-2023	Loss PACS	96.82	0	0	-39.62	328	1458	293	0	154	-39.56	22.92
120	2023-2024	Loss PACS	57.11	0	0	-46.14	294	1461	318	0	191	-39.62	24
120	2024-2025	Loss PACS	45.5	0	0	-82.97	320	1979	283	0	200	-46.14	26.76
121	2020-2021	Loss PACS	365	0	41.17	-434	3658						278.4
121	2021-2022	Loss PACS	369	0	42.43	-489	3656	12314	2672	874	2320	-434	312.96
121	2022-2023	Loss PACS	374	0	0.000177	-515	3662	12441	2760	888	2608	-489	307.56
121	2023-2024	Loss PACS	419	0	46.21	-581	3534	12432	2724	941	2563	-515	276.96
121	2024-2025	Loss PACS	238	0	29.66	-710	3466	12558	2454	1083	2308	-581	291.24
122	2020-2021	Loss PACS	2101	0	0	-71.57	3913						201.36
122	2021-2022	Loss PACS	2011	0	0.09889	-89.88	3911	6724	2704	1154	1678	-71.57	195.72
122	2022-2023	Loss PACS	1925	0	0	-151	3800	6738	2705	1154	1631	-89.88	198.6
122	2023-2024	Loss PACS	1671	0	0	-176	3627	7199	2596	1150	1655	-151	200.64
122	2024-2025	Loss PACS	1709	0	0	-191	3652	7248	2314	1257	1672	-176	201.36
123	2020-2021	Loss PACS	27.87	0	1.49	-201	725						54.72
123	2021-2022	Loss PACS	27.8	0	1.74	-258	756	3347	217	471	456	-201	59.88
123	2022-2023	Loss PACS	5.11	0	0.03068	-297	701	3370	235	503	499	-258	54.24
123	2023-2024	Loss PACS	0.542767	0	-0.07709	-340	618	4064	735	447	452	-297	41.88
123	2024-2025	Loss PACS	47.85	0	0.00818	-386	746	4127	235	365	349	-340	47.4
201	2020-2021	Profit PACS	762	0	1.85	12.29	2994						287.28
201	2021-2022	Profit PACS	1022	0	1.4	24.73	3352	2666	2752	160	2394	12.29	300.36
201	2022-2023	Profit PACS	1465	9.19	3.25	28.04	3877	2751	3062	196	2503	24.73	325.92
201	2023-2024	Profit PACS	1476	0	2.97	34.92	4234	2845	3685	95.62	2716	28.04	375.48
201	2024-2025	Profit PACS	1326	0	1.35	35.08	4775	3043	3935	134	3129	34.92	452.4
202	2020-2021	Profit PACS	1681	31.33	1.94	12.11	5552						484.8
202	2021-2022	Profit PACS	2151	30.78	4.68	17.61	6305	12832	5258	242	4040	12.11	528
202	2022-2023	Profit PACS	2254	30.78	3.15	20.84	6616	13433	5888	342	4400	17.61	580.08
202	2023-2024	Profit PACS	1920	32.14	3.16	27.62	6808	14012	6129	330	4834	20.84	664.8
202	2024-2025	Profit PACS	2389	32.14	2.81	28.31	7676	14425	6343	350	5540	27.62	706.92
203	2020-2021	Profit PACS	3634	0	-6.78	2.22	12731						1064.28
203	2021-2022	Profit PACS	3503	0	-10.79	2.78	14376	7838	12133	365	8869	2.22	1232.88
203	2022-2023	Profit PACS	4167	0	-9.61	6.62	14872	7839	12965	1040	10274	2.78	1274.88
203	2023-2024	Profit PACS	3967	0	-5.06	33.66	15192	7827	13722	792	10624	6.62	1362.96
203	2024-2025	Profit PACS	4876	0	-0.39913	62.92	16676	4423	14024	798	11358	33.66	1418.88
204	2020-2021	Profit PACS	5301	0	12.22	4.66	16880						1412.16
204	2021-2022	Profit PACS	6192	10.1	12.39	8.47	18319	17293	13945	93.93	11768	4.66	1456.44
204	2022-2023	Profit PACS	6396	13.6	8.18	33.48	19880	17382	17668	200	12137	8.47	1652.52
204	2023-2024	Profit PACS	5209	15.12	11.32	45.75	20380	17461	19315	202	13771	33.48	1894.32
204	2024-2025	Profit PACS	5798	15.12	13.49	52.48	21491	18082	19799	192	15786	45.75	1922.88
205	2020-2021	Profit PACS	4265	0	1.08	37.21	11548						955.08
205	2021-2022	Profit PACS	5122	153	5.47	38.79	13358	3823	10606	594	7959	37.21	1066.68
205	2022-2023	Profit PACS	4792	0	7.2	52.26	14032	3799	11652	1164	8889	38.79	1233.96
205	2023-2024	Profit PACS	4632	152	2.71	55.8	14870	3633	13074	698	10283	52.26	1399.92
205	2024-2025	Profit PACS	4092	152	5.17	60.24	16366	3602	13849	723	11666	55.8	1675.56
206	2020-2021	Profit PACS	1622	0	-0.03508	19.95	2374						117.24
206	2021-2022	Profit PACS	1880	0	0	21.18	2703	4850	2101	0	977	19.95	127.56
206	2022-2023	Profit PACS	1990	0	0	30.07	2954	8420	2416	0	1063	21.18	145.44
206	2023-2024	Profit PACS	1950	0	0	31.58	3023	8817	2708	0	1212	30.07	163.44
206	2024-2025	Profit PACS	2359	0	0	38.08	3487	9220	2802	0	1362	31.58	170.76
207	2020-2021	Profit PACS	1319	0	1.5	1.29	4425						413.52
207	2021-2022	Profit PACS	1542	0	2.5	13.77	5208	6703	4287	0	3446	1.29	493.44
207	2022-2023	Profit PACS	1060	0	1.5	40.48	5955	23943	5091	0	4112	13.77	593.76
207	2023-2024	Profit PACS	1073	0	2.08	40.68	6742	24558	5709	101	4948	40.48	662.76
207	2024-2025	Profit PACS	1018	0	2.42	55.95	7047	25165	6513	20.99	5523	40.68	710.64
208	2020-2021	Profit PACS	1265	0	0.001139	17.05	6591						651.72
208	2021-2022	Profit PACS	1637	0	0.042351	36.61	7253	7634	5593	819	5431	17.05	688.8
208	2022-2023	Profit PACS	1997	0	0	38.85	7962	7779	6090	977	5740	36.61	735.96
208	2023-2024	Profit PACS	2518	0	0.047567	41.65	9115	9495	6775	977	6133	38.85	874.68
208	2024-2025	Profit PACS	2545	0	0.060746	50.33	10328	9840	7802	1083	7289	41.65	1023.96
209	2020-2021	Profit PACS	3209	0	0.671112	23.82	7879						618.48
209	2021-2022	Profit PACS	2677	0	0.767964	26.35	8170	18700	7311	500	5154	23.82	712.8
209	2022-2023	Profit PACS	3481	0	0.912634	28.38	9725	19145	7606	500	5940	26.35	806.52
209	2023-2024	Profit PACS	2813	0	1.55	30.33	10026	19573	9079	650	6721	28.38	948.6
209	2024-2025	Profit PACS	2938	0	0.947373	36.6	10924	20009	9391	628	7905	30.33	1065.84
210	2020-2021	Profit PACS	6491	0	0.387303	42.16	12476						783.12
210	2021-2022	Profit PACS	6985	0	0.552109	49.5	13286	22988	12113	0	6526	42.16	832.44
210	2022-2023	Profit PACS	7725	0	-0.12504	57.32	13541	23170	12906	0	6937	49.5	841.92
210	2023-2024	Profit PACS	7672	0	0.017296	78.75	13940	23638	13302	0	7016	57.32	883.92
210	2024-2025	Profit PACS	7798	0	0.025456	82.12	14569	24736	13670	0	7366	78.75	945.84
211	2020-2021	Profit PACS	1913	0	0.239419	1.06	5442						426.24
211	2021-2022	Profit PACS	2026	0	-0.3878	1.76	5982	12933	5348	0	3552	1.06	468.12
211	2022-2023	Profit PACS	3386	0	0.020457	8.05	7283	13176	5878	0	3901	1.76	469.44
211	2023-2024	Profit PACS	3752	0	0.027529	20.49	7711	13377	7171	0	3912	8.05	497.76
211	2024-2025	Profit PACS	3547	0	0.241306	21.08	8072	13630	7588	0	4148	20.49	570.48
212	2020-2021	Profit PACS	3167	0	88.14	68.98	22471						2827.8
212	2021-2022	Profit PACS	1831	0	44.47	162	22471	15486	19148	2872	23565	68.98	2867.52
212	2022-2023	Profit PACS	618	0	13.1	178	23449	21185	19978	6919	23896	162	2956.68
212	2023-2024	Profit PACS	217	0	42.31	186	23541	21948	17369	4198	24639	178	3132.36
212	2024-2025	Profit PACS	218	0	62.99	228	3011	22830	17305	5559	26103	186	3229.68
213	2020-2021	Profit PACS	871	0	0	0.265303	3179						313.56
213	2021-2022	Profit PACS	1312	0	0.001	5.17	3495	3415	3028	102	2613	0.265303	324.84
213	2022-2023	Profit PACS	1619	0	0	8	3601	3421	3226	217	2707	5.17	324.6
213	2023-2024	Profit PACS	1720	0	0	11.48	3756	3443	3469	82.76	2705	8	339
213	2024-2025	Profit PACS	1971	0	37.22	37.22	3921	3467	3674	31.3	2825	11.48	349.32

Annexure IV

P-Value Matrix Table of GLOSP Financial Indicators - Part 1

	NPM	ROW	GPR	OCR	CR	WCR	DLC	LWC	DR
NPM	0.0000	0.0000	0.1881	0.0652	0.0000	0.0000	0.0015	0.1533	0.0000
ROW	0.0000	0.0000	0.3194	0.0242	0.0000	0.0000	0.0014	0.0912	0.0000
GPR	0.1881	0.3194	0.0000	0.7859	0.0233	0.6465	0.0125	0.7138	0.6165
OCR	0.0652	0.0242	0.7859	0.0000	0.0140	0.0001	0.0082	0.3205	0.0017
CR	0.0000	0.0000	0.0233	0.0140	0.0000	0.0000	0.0080	0.1378	0.0000
WCR	0.0000	0.0000	0.6465	0.0001	0.0000	0.0000	0.0002	0.0000	0.0000
DLC	0.0015	0.0014	0.0125	0.0082	0.0080	0.0002	0.0000	0.8746	0.0000
LWC	0.1533	0.0912	0.7138	0.3205	0.1378	0.0000	0.8746	0.0000	0.1627
DR	0.0000	0.0000	0.6165	0.0017	0.0000	0.0000	0.0000	0.1627	0.0000
OE	0.1650	0.2655	0.0000	0.6701	0.0335	0.7622	0.0008	0.6128	0.8788
DE	0.0000	0.0000	0.5128	0.0981	0.0045	0.0000	0.0000	0.1844	0.0004
CAP	0.6124	0.4154	0.8991	0.6700	0.0800	0.0012	0.3448	0.0000	0.0727
FAR	0.0000	0.0000	0.5527	0.0152	0.0000	0.0025	0.0664	0.6317	0.0000
MG	0.7240	0.6703	0.8396	0.6567	0.5720	0.8099	0.3930	0.3140	0.9884
DG	0.1859	0.3736	0.6701	0.4225	0.2567	0.0520	0.7212	0.7835	0.2544
LG	0.0000	0.0000	0.7078	0.0235	0.0010	0.0000	0.0221	0.4391	0.0136
BG	0.7036	0.8182	0.0002	0.6639	0.2398	0.6869	0.5726	0.9589	0.9880
PG	0.1665	0.1434	0.8218	0.0749	0.0720	0.0523	0.2608	0.9540	0.0277

Part 2

	OE	DE	CAP	FAR	MG	DG	LG	BG	PG
NPM	0.1650	0.0000	0.6124	0.0000	0.7240	0.1859	0.0000	0.7036	0.1665
ROW	0.2655	0.0000	0.4154	0.0000	0.6703	0.3736	0.0000	0.8182	0.1434
GPR	0.0000	0.5128	0.8991	0.5527	0.8396	0.6701	0.7078	0.0002	0.8218
OCR	0.6701	0.0981	0.6700	0.0152	0.6567	0.4225	0.0235	0.6639	0.0749
CR	0.0335	0.0045	0.0800	0.0000	0.5720	0.2567	0.0010	0.2398	0.0720
WCR	0.7622	0.0000	0.0012	0.0025	0.8099	0.0520	0.0000	0.6869	0.0523
DLC	0.0008	0.0000	0.3448	0.0664	0.3930	0.7212	0.0221	0.5726	0.2608
LWC	0.6128	0.1844	0.0000	0.6317	0.3140	0.7835	0.4391	0.9589	0.9540
DR	0.8788	0.0004	0.0727	0.0000	0.9884	0.2544	0.0136	0.9880	0.0277
OE	0.0000	0.3144	0.7640	0.6179	0.9441	0.7018	0.7242	0.0000	0.9216
DE	0.3144	0.0000	0.5920	0.0000	0.4240	0.1131	0.0000	0.6612	0.1150
CAP	0.7640	0.5920	0.0000	0.4381	0.3248	0.9306	0.6855	0.8498	0.9885
FAR	0.6179	0.0000	0.4381	0.0000	0.9317	0.5264	0.0018	0.7907	0.3314
MG	0.9441	0.4240	0.3248	0.9317	0.0000	0.9707	0.6846	0.9246	0.8435
DG	0.7018	0.1131	0.9306	0.5264	0.9707	0.0000	0.4285	0.8741	0.8324
LG	0.7242	0.0000	0.6855	0.0018	0.6846	0.4285	0.0000	0.4796	0.7040
BG	0.0000	0.6612	0.8498	0.7907	0.9246	0.8741	0.4796	0.0000	0.8385
PG	0.9216	0.1150	0.9885	0.3314	0.8435	0.8324	0.7040	0.8385	0.0000

Source: Computed by the researcher.

Note: The table reports exact p-values corresponding to the Pearson correlation coefficients presented in the correlation matrix. P-values are provided to support statistical transparency and interpretation. Statistical significance in this table is not interpreted as evidence of causal relationships and is not used as a criterion for indicator selection.

Annexure V The Z-Score Panel

PACS_Code	Year	Z_OCR	Z_CR	Z_WCR	Z_DLC	Z_LWC	Z_DR	Z_OE	Z_DE
101	2021-2022	0.4019769	0.15412896	0.40667549	-0.40665	-0.1473347	-0.2426347	-0.2729238	-0.2018007
101	2022-2023	-0.2281316	-0.0472106	0.48460235	-0.3978924	-0.1331879	-0.2867548	-0.2161647	-0.3047922
101	2023-2024	-0.3330766	-0.3420882	0.53156076	-0.3970236	-0.0838815	-0.1755487	-0.1334666	-0.4274801
101	2024-2025	-0.2091605	-0.2965708	0.5374375	-0.3388277	-0.1059316	-0.2489936	-0.176393	-0.518381
102	2021-2022	-0.0283227	-1.2934286	0.85045862	-0.5290557	0.00524854	-1.1903788	-0.2900812	2.40492676
102	2022-2023	0.03624215	-1.2947038	0.88214534	-0.5290758	-0.0083851	-1.2214533	-0.2900812	2.50386718
102	2023-2024	-0.2645331	-1.2734481	1.18074475	-0.5288651	-0.0943225	-1.2134139	-0.2900812	2.65206863
102	2024-2025	-0.219561	-1.2939515	1.34819234	-0.5290766	-0.1333286	-1.1810233	-0.2900812	2.722092
103	2021-2022	0.35722309	-0.7296994	0.16911844	-0.4514234	0.0925943	-0.9441915	-0.2900812	-0.2306661
103	2022-2023	0.49480357	-0.7970462	0.25039764	-0.4801624	0.09534421	-0.9256094	-0.282023	-0.0337576
103	2023-2024	0.23768245	-0.8749842	0.20201493	-0.4988156	0.12382266	-1.0416257	-0.2900812	0.14660687
103	2024-2025	0.19350358	-1.0396008	0.25687171	-0.5020104	0.14549349	-0.9114292	-0.2900812	-0.0816139
104	2021-2022	0.50320712	2.46162984	-0.1143486		-0.7855007	2.99645115	-0.268775	-0.7680203
104	2022-2023	0.04530042	2.6872309	0.00207213		-0.8686348	4.09664781	-0.3216481	-0.7680203
104	2023-2024	-0.0611702	2.1406889	-0.0114309		-0.6936763	3.54313264	-0.2900812	-0.7680203
104	2024-2025	-0.1190799	1.63632646	-0.0708935		-0.5079109	2.52249438	-0.1845135	-0.7680203
105	2021-2022	0.16449297	0.51676285	-0.6290851		0.21862862	0.36136566	0.06809818	-0.7680203
105	2022-2023	0.63330525	0.14378833	-0.6022911		0.30463514	0.41785791	-0.4781619	-0.7680203
105	2023-2024	0.19050107	-0.0413086	-0.5926117		0.34440793	0.54058191	0.83181813	-0.7680203
105	2024-2025	0.27556485	0.30210366	-0.5444704		0.20910107	0.46045221	0.56556458	-0.7680203
106	2021-2022	0.33100268	-0.2368735	0.91354193	-0.5135219	-0.1027147	-0.8231238	-0.2755668	1.5289635
106	2022-2023	0.61807475	0.00353275	0.97265702	-0.5073162	-0.1651814	-0.7630019	-0.3114898	2.01472394
106	2023-2024	0.19621308	-0.8153391	1.29729541	-0.5188096	-0.1323333	-0.5379093	-0.2666611	1.48999015
106	2024-2025	0.41807042	-0.9767801	1.67472982	-0.5211298	-0.1896284	-0.8079644	-0.2806784	1.488603
107	2021-2022	-0.1301557	-1.1965654	0.76676296	1.4898715	0.0291437	-0.1885226	5.50750344	-0.7638459
107	2022-2023	-0.1560207	-1.2212207	0.88843883	1.36533498	-0.0002066	-0.3537224	5.82312066	-0.7645763
107	2023-2024	-0.0408732	-1.1822273	0.45575282	2.82052426	0.12354257	-0.343	4.29861167	-0.7653837
107	2024-2025	-0.1578687	-1.1877362	0.63612606	-0.515493	0.07759197	-0.2375326	4.84910229	-0.1617785
108	2021-2022	0.05937882	0.28564528	-0.4718052	0.91127034	0.06420551	0.20005812	-0.3186628	-0.6272408
108	2022-2023	-0.1042877	0.49171305	-0.5212965	1.22681192	0.0145713	0.39539302	-0.0566674	-0.6394925
108	2023-2024	-0.208606	0.23538558	-0.4465453		0.05675447	0.41411578	-0.3337654	-0.7680203
108	2024-2025	-0.1482135	-0.4733207	-0.3663586	-0.0858229	0.24292174	0.16982532	-0.3536384	-0.5342731
109	2021-2022	-0.085458	-0.8909516	1.21016783	-0.523092	-0.1228302	-0.4585372	-0.2371512	1.53475711
109	2022-2023	-0.0301115	-1.1132296	1.65218528	-0.5273626	-0.1915499	-0.5681568	-0.2900812	1.65541659
109	2023-2024	-0.0629043	-1.2692121	2.26754938	-0.5289007	-0.283681	-0.5678236	-0.2900812	1.77136843
109	2024-2025	-0.1817915	-1.1812242	2.92116735	-0.5285218	-0.3819102	-0.5062679	-0.2900812	2.00173917
110	2021-2022	-0.1351377	-0.2388907	-0.2735196	0.24320727	0.12281212	-0.4039619	-0.1817726	-0.6250749
110	2022-2023	-0.109416	-0.091647	-0.2893971		0.07599537	-0.051089	-0.3310017	-0.7680203
110	2023-2024	-0.232904	-0.1100641	-0.2884038		0.08471064	0.32198152	-0.2659189	-0.7680203
110	2024-2025	-0.2417773	-0.406535	-0.198185	-0.3110964	0.14855627	-0.2580782	-0.251825	-0.3729783
111	2021-2022	0.37042464	-0.834889	0.52111745	0.52339785	0.00075441	-0.7429277	-0.5022975	-0.7097761
111	2022-2023	0.13126606	-0.8857974	0.6570663	-0.0990083	-0.0169342	-0.7762198	-0.6877805	-0.6503481
111	2023-2024	0.10549436	-1.0298636	0.7945001	-0.2462368	-0.02341	-0.7311061	-0.4520877	-0.6570132
111	2024-2025	0.08630756	-1.0400048	0.92522686	-0.2516758	-0.0588464	-0.791462	-0.6846819	-0.6595119
112	2021-2022	0.24206243	-0.1945915	-0.1756444	0.23143685	0.13702153	-0.4289611	-0.173279	-0.6745196
112	2022-2023	0.02078095	-0.0636867	-0.1786957	1.39324532	0.09677166	-0.2509002	-0.2373264	-0.7245311
112	2023-2024	-0.058371	-0.4204986	-0.1765584	0.77564478	0.20094748	-0.2662046	-0.2395152	-0.7195648
112	2024-2025	-0.0163584	-0.3280556	-0.1690458	1.04644418	0.17072976	-0.3026013	-0.2294186	-0.719187
113	2021-2022	-0.125741	-0.577885	-0.2675164	-0.3391684	0.24776766	-0.7899626	-0.2738064	-0.5083968
113	2022-2023	-0.0354611	-0.6148308	-0.2192495	0.03943232	0.23034613	-0.7388125	-0.1061027	-0.6802146
113	2023-2024	-0.1609026	-0.7498492	-0.2216432	-0.1105411	0.28149756	-0.596638	-0.0338215	-0.6675694
113	2024-2025	-0.1369085	-0.7229367	-0.1882457	-0.1244059	0.25791778	-0.6971168	-0.3799986	-0.6588568
114	2021-2022	-0.0505753	-0.5458366	0.3404482	-0.5149614	0.09308612	-0.7355796	0.79386008	1.04478744
114	2022-2023	-0.187802	-0.5785866	0.52640163	-0.5164993	0.03481732	-0.7089044	-0.9066565	1.07521006
114	2023-2024	-0.0603245	-0.5626145	0.72896747	-0.5175243	-0.0307644	-0.7364347	-0.3428029	1.1834973
114	2024-2025	0.39884158	-0.4425096	0.92939988	-0.5132356	-0.1161846	-0.6431621	-0.5278777	1.12390076
115	2021-2022	0.15026795	0.34487474	0.9342654	-0.4735934	-0.2883442	0.56675356	-0.2235895	0.64440768
115	2022-2023	0.37384467	0.09816376	1.07897891	-0.4826993	-0.277629	0.08123451	-0.269809	0.82394718
115	2023-2024	0.1597601	-0.4526189	1.51815355	-0.4908047	-0.2940959	0.52796858	-0.288949	0.53091382
115	2024-2025	0.11685499	-0.3483958	1.45105451	-0.4794855	-0.3086044	0.32047192	-0.2900812	0.45290203
116	2021-2022	-0.1569413	-0.8398035	0.30021505	-0.5243848	0.15760753	-0.8510195	0.164536	2.01832708
116	2022-2023	-0.2643377	-0.8831634	0.44824521	-0.5249244	0.10791715	-0.9384561	-0.1342782	2.07382998
116	2023-2024	-0.1672666	-0.9732516	0.78767116	-0.5259808	-0.0133336	-0.8157186	0.86453508	2.31535884
116	2024-2025	-0.2373764	-0.8388713	1.06887085	-0.5245299	-0.1087467	-0.8562147	1.70882522	2.57778793
117	2021-2022	-0.3535003	-0.3992341	1.0726109	-0.5187048	-0.1042079	-0.5681303	-0.361612	2.43172009
117	2022-2023	-0.2652995	-0.7296099	1.3990975	-0.5227101	-0.1439327	-0.8912111	-0.2629303	2.43344825
117	2023-2024	-0.320334	0.00592505	1.53339737	-0.5150962	-0.2552878	-0.6907345	-0.2900812	2.57232921
117	2024-2025	-0.2999372	-1.2318466	2.17135849	-0.5217818	-0.3030118	-1.0225372	-0.2900812	2.41694116
118	2021-2022	0.05604826	0.18188329	-0.1938808	-0.3673691	0.08726403	-0.6270244	-0.0439631	-0.4189178
118	2022-2023	-0.0620702	0.04507079	-0.0455802	0.002051	-0.0046578	-0.7222356	-0.4302763	-0.6440829
118	2023-2024	-0.0962926	0.09563066	-0.1420211	-0.2212769	0.05957725	-0.2596444	-0.3197677	-0.5589021
118	2024-2025	-0.1604526	0.35191434	-0.141601	-0.3540363	0.02592048	-0.3527876	-0.204509	-0.3315523

PACS_Code	Year	Z_CAP	Z_FAR	Z_MG	Z_DG	Z_LG	Z_BG	Z_PG
101	2021-2022	0.33717532	-0.5928326	-0.170137	-0.1014737	-0.06581	-0.10087	-0.2605
101	2022-2023	0.34584868	-0.5798043	-0.1683132	-0.1159043	-0.28524	-0.10277	-0.28223
101	2023-2024	0.44825809	-0.5497379	-0.1580932	-0.1485121	-0.25926	-0.10581	-0.26082
101	2024-2025	0.48559428	-0.5497379	-0.0099528	-0.1063795	-0.59844	-0.10629	-0.30681
102	2021-2022	-0.2564959	2.32501594	-0.1855	-0.2306469	-1.25772	-0.09218	-0.30557
102	2022-2023	-0.2292381	2.57962006	-0.1916449	-0.2551577	-0.99947	-0.09444	-0.28045
102	2023-2024	-0.2253365	3.07559066	-0.1916782	-0.3201321	-1.43596	-0.09444	-0.26137
102	2024-2025	-0.2288204	3.32110902	-0.185526	-0.2112494	-0.88003	-0.09442	-0.26573
103	2021-2022	-0.0986641	1.73019606	-0.0586049	-0.0001121	0.444558	-0.09186	-0.24543
103	2022-2023	-0.1190441	1.28105164	-0.0611047	-0.0514455	0.553644	-0.0705	-0.27713
103	2023-2024	-0.0724762	1.91320865	-0.1123978	-0.0617328	0.732416	-0.07276	-0.25308
103	2024-2025	-0.1053131	1.64114118	-0.118761	0.12929155	0.786153	-0.10285	-0.28383
104	2021-2022	-0.1495682	1.16632337	-0.1781609	-0.1072618	0.977657		-0.0284
104	2022-2023	-0.4094953	0.45201345	4.29370679	0.58517523	0.342351		-0.0507
104	2023-2024	-0.2007604	0.5172998	-0.2157525	-0.212928	6.134549		-0.20389
104	2024-2025	-0.0682466	0.46686098	-0.1635904	0.05728069	5.462861		-0.27258
105	2021-2022	1.34122604	-0.1069598	-0.1470132	-0.1030727	-0.46295		0.301991
105	2022-2023	1.26981487	-0.1121213	-0.1753991	-0.1096404	0.35866		2.307596
105	2023-2024	1.51723745	0.12544556	-0.1623243	-0.2859685	-0.95895		-0.10912
105	2024-2025	1.56453289	0.2596621	-0.2745357	-0.198164	-1.44931		0.495524
106	2021-2022	0.07426903	-0.6593961	-0.0698718	-0.1058451	0.027806	-0.09314	-0.19044
106	2022-2023	-0.2107231	-0.6709219	0.57063557	-7.658E-05	-0.62413	-0.09566	-0.23745
106	2023-2024	-0.1274057	-0.5839389	-0.7483136	-0.0741914	-0.63575	-0.10256	-0.22245
106	2024-2025	-0.2109046	-0.5516868	-0.1797724	0.08427686	-0.20613	-0.0941	-0.3052
107	2021-2022	-0.1019078	0.13815167	-0.0294776	-0.0250475	-0.1755	-0.09442	0.007774
107	2022-2023	-0.1230631	0.10130625	-0.172072	-0.0707343	-0.17755	-0.10124	-0.06482
107	2023-2024	-0.0139963	-0.0276183	-0.5775123	-0.1770694	0.373124	-0.10237	-0.20592
107	2024-2025	-0.1355817	-0.1268479	-0.1758936	-0.1455731	0.366612	11.08334	-0.29638
108	2021-2022	-0.4573302	2.06459678	0.02962552	-0.1023341	0.4388	-0.09442	-0.14898
108	2022-2023	-0.4344245	2.30259176	-0.1391497	-0.043224	-0.31541	-0.09442	-0.04128
108	2023-2024	-0.449086	2.15668033	-0.1540582	-0.0457054	0.587402	-0.14214	-0.24865
108	2024-2025	-0.461373	2.0927753	-0.1593812	-0.128966	1.39759		-0.25075
109	2021-2022	0.00639303	0.19824899	-0.0290861	-0.3009657	-1.62113	-0.09016	-0.30868
109	2022-2023	0.1627096	0.57275471	-0.1824331	-0.605626	-1.93145	-0.09222	-0.18785
109	2023-2024	0.19719603	0.87595612	-0.1461207	-0.3855498	-1.49842	-0.09241	-0.23961
109	2024-2025	0.21596666	1.19188719	-0.1841655	-0.5207062	-1.59964	-0.09056	-0.25828
110	2021-2022	-0.3062912	1.72265149	-0.1824331	-0.1983539	-0.46681	-0.09344	-0.16531
110	2022-2023	-0.2941923	1.68156726	-0.1299711	-0.092958	-0.66071	-0.14214	-0.04986
110	2023-2024	-0.2910691	1.67635974	-1.5912603	-0.152888	-0.3042		0.165589
110	2024-2025	-0.2815591	1.68784566	3.12380741	-0.2592026	-0.07649		-0.27083
111	2021-2022	-0.5041823	0.25593046	-0.1560846	-0.2776571	-0.01599	-0.11295	-0.18536
111	2022-2023	-0.4579304	0.14180393	-0.1507744	-0.1487481	-0.48216	-0.03791	-0.19253
111	2023-2024	-0.4272486	0.17081518	-0.1557116	-0.139159	-0.35487	-0.09443	-0.21275
111	2024-2025	-0.4249655	0.25459159	-0.145461	-0.1395098	-0.62819	-0.09489	-0.23073
112	2021-2022	0.15297932	-0.3261861	-0.1824331	-0.1268925	-1.05648	-0.08819	-0.04205
112	2022-2023	0.10383832	-0.3473112	-2.1930864	-0.0695905	-0.33324	-0.11976	-0.1393
112	2023-2024	0.03126503	-0.3728469	-0.1772405	-0.09635	0.618892	-0.09012	0.356589
112	2024-2025	-0.0761175	-0.4351394	-0.1809525	-0.0335951	0.029451	-0.09472	-0.24496
113	2021-2022	0.07899897	1.40988921	-0.1730117	-0.1490643	0.490297	-0.09266	0.059617
113	2022-2023	0.04748511	1.21685078	-0.0909127	0.06387406	0.349365	-0.12465	-0.10969
113	2023-2024	-0.0167183	0.94260783	-0.112202	0.01646684	0.963161	-0.08376	-0.11134
113	2024-2025	-0.0220353	0.88876671	-0.1309853	-0.0985071	-0.24125	-0.08836	-0.06612
114	2021-2022	0.1536152	0.49067568	0.03375939	-0.163864	-0.64598	-0.09454	-0.23412
114	2022-2023	0.17673394	0.55970765	0.07847005	-0.1824086	-0.72567	-0.09206	-0.26224
114	2023-2024	0.17127026	0.77937454	-0.2141654	-0.2441004	-1.02519	-0.09259	-0.18186
114	2024-2025	0.10792567	0.82684194	-0.140051	0.01197746	-0.88304	-0.0968	-0.23871
115	2021-2022	0.03327306	-0.1880083	-0.1846386	-0.1193461	0.467414	-0.09182	-0.23433
115	2022-2023	-0.0884162	-0.1615961	1.46726293	-0.1094582	-0.0369	-0.09213	-0.28425
115	2023-2024	-0.0971073	0.17135324	-1.1794732	-0.1417075	-1.27755	-0.10685	-0.23683
115	2024-2025	-0.1420782	0.07365149	-0.1794999	-0.0047076	-0.06483	-0.09635	-0.28843
116	2021-2022	-0.0273696	1.12706668	-0.0756515	-0.1507887	0.217842	-0.08945	-0.18446
116	2022-2023	-0.0421577	1.20352703	-1.6876074	-0.1445746	-0.59865	-0.09311	-0.24425
116	2023-2024	-0.1024285	2.38484623	3.77817443	-0.1409056	-1.06449	-0.0918	-0.23205
116	2024-2025	-0.130212	2.50917056	-0.1217804	0.03316534	-0.8869	-0.08982	-0.24343
117	2021-2022	-0.2258088	-0.4682322	-0.1305617	-0.1510718	-0.79361	-0.09429	-0.20673
117	2022-2023	-0.2163686	-0.3309298	-1.2672245	-0.2115759	-0.96861	-0.0952	-0.22491
117	2023-2024	-0.2396855	-0.3013396	1.75849647	-0.1731094	-1.30324	-0.09289	-0.25432
117	2024-2025	-0.2016153	-0.1172795	-0.1658071	11.8255901	-1.21129	-0.09669	-0.28403
118	2021-2022	0.78204021	-0.1925341	-0.1573865	-0.1077696	1.405459	-0.093	0.052457
118	2022-2023	0.59996708	-0.3560607	0.07268739	0.46556358	0.722083	-0.12305	-0.28836
118	2023-2024	0.57330002	-0.4123555	0.01086438	-0.1801866	0.527546	-0.05844	-0.23472
118	2024-2025	0.43784978	-0.5184141	-0.1345128	-0.0688392	0.469824	-0.03682	-0.2907

Year	Z_OCR	Z_CR	Z_WCR	Z_DLC	Z_LWC	Z_DR	Z_OE	Z_DE
2021-2022	0.53339471	-0.1642601	0.621696	-0.4784932	-0.1267461	-0.5764795	-0.3105729	0.43123077
2022-2023	0.35236776	-0.1739468	0.78120365	-0.4720886	-0.1837997	-0.0501562	-0.2900812	0.30307665
2023-2024	0.20253814	-0.0863127	0.87594581	-0.450907	-0.2430183	-0.0795287	-0.2900812	0.14399371
2024-2025	0.43963701	-0.2854199	1.02176179	-0.4589692	-0.241958	-0.1506059	-0.2900812	0.07484628
2021-2022	0.20533119	0.70676667	0.12122596		-0.2598251	0.37292468	-0.2900812	-0.7680203
2022-2023	-0.1626393	0.27054836	0.16496075		-0.1487244	0.20260735	-0.2900812	-0.7680203
2023-2024	0.02967485	-0.2587268	0.17402786		0.00522955	0.14697759	-0.2900812	-0.7680203
2024-2025	0.1646408	-0.5375068	0.3121445		0.03132397	-0.1410022	-0.2900812	-0.7680203
2021-2022	0.39828658	-0.6098461	0.29389693	-0.4913401	0.05721413	-0.5409218	1.70569552	0.57498847
2022-2023	0.9772567	-0.5912739	0.32684926	-0.4929852	0.0360638	-0.5668934	-0.290075	0.66546927
2023-2024	0.24985527	-0.4188574	0.56798886	-0.4939456	-0.0375009	-0.5751973	2.50688487	0.89265896
2024-2025	0.38010762	-0.7665564	0.45332271	-0.5106134	0.03659824	-0.6248375	1.30333906	1.17319103
2021-2022	-0.3912106	2.53364874	-0.0250784	-0.370662	-0.4085044	2.06721588	-0.2706491	1.1024672
2022-2023	-0.2453665	2.52378816	-0.0606336	-0.3769111	-0.3794324	2.08010681	-0.2900812	1.08032565
2023-2024	0.42746998	2.42377643	0.00366459	-0.4082431	-0.3394163	2.00588488	-0.2900812	1.16118961
2024-2025	0.00434058	2.65186127	-0.0153762	-0.4155257	-0.3417939	2.03746579	-0.2900812	1.3809646
2021-2022	-0.0019149	-0.6892285	0.97424957	-0.5241012	-0.0265486	-1.1558648	0.54580703	1.1298189
2022-2023	0.27984965	-1.2632643	1.24381883	-0.5280874	-0.050532	-0.8546191	-0.2788978	0.88236765
2023-2024	0.34747076	-1.2871997	1.88212386	-0.5289918	-0.1763736	-0.8926187	-0.324305	0.64760057
2024-2025	0.0223691	-0.5423948	1.66683492	-0.51833	-0.2317506	-0.8508645	-0.2853766	0.96431184
2021-2022	-0.2922195	0.42162034	-0.3847131	-0.0549702	0.10966179	-0.0882031	-0.0820298	-0.5113158
2022-2023	-0.2641634	0.75048057	-0.4537121	0.86408119	0.03708678	0.12548428	0.10576112	-0.6625372
2023-2024	-0.3653649	0.63467703	-0.4706641	0.47250616	0.09755844	0.49293103	0.10566652	-0.6710665
2024-2025	-0.3490863	0.23503194	-0.4192089	0.59777689	0.17694605	0.17694366	-0.1392963	-0.701261
2021-2022	-0.1832844	0.58427735	-0.3862559	0.04280111	0.03287026	0.36168647	-0.0104663	-0.509718
2022-2023	-0.2394747	0.59685941	-0.4654778	0.09198098	0.0844121	0.51630834	-0.1007386	-0.5442939
2023-2024	-0.2394765	0.26142568	-0.5216814	-0.0302881	0.21501171	0.52724267	-0.1245835	-0.5512198
2024-2025	-0.2490315	0.41244991	-0.4774113	0.09156371	0.14225627	0.5487512	-0.1489237	-0.5616143
2021-2022	-0.5086499	0.093838	-0.0935007	-0.2228362	0.05928152	0.3404028	-1.191719	-0.4054907
2022-2023	-0.2978713	0.2664628	-0.2146623	-0.0506892	0.05880881	0.09743953	-0.6248729	-0.509718
2023-2024	-0.2614503	0.15922582	-0.2544884	-0.077077	0.11109509	0.13825275	-0.4381108	-0.5181715
2024-2025	-0.2712188	0.3986009	-0.2377516	-0.2321444	0.05044807	0.12315068	-0.3015735	-0.3169731
2021-2022	0.02662572	0.50769227	-0.24546	2.28619505	-0.0226457	0.39643069	-0.1052938	-0.6769084
2022-2023	-0.1813743	0.40807606	-0.291769	2.35015509	0.02477201	0.30340803	-0.1322312	-0.6792838
2023-2024	-0.2350436	0.05726075	-0.3337127	1.93793611	0.15345593	0.20718193	-0.0716384	-0.6849482
2024-2025	-0.1891175	0.11854932	-0.2929695		0.10792676	0.08196749	-0.0537469	-0.7680203
2021-2022	-0.2941407	0.96713062	-0.4021614	-0.1289854	-0.0180756	0.65575683	-0.0898426	-0.1531657
2022-2023	-0.3346041	0.59051387	-0.4408637	0.09516609	0.08782581	0.36996707	-0.0191792	-0.40815
2023-2024	-0.3683473	0.42520752	-0.515578	0.05345544	0.16909365	0.40337579	-0.1899372	-0.4143222
2024-2025	-0.3663169	0.08469689	-0.5332086	-0.0483742	0.27697152	0.16252318	-0.1245049	-0.4209266
2021-2022	0.1494728	2.71258203	-0.471247		-0.4458509	2.01024695	-0.2900812	-0.7680203
2022-2023	0.08576862	2.48942324	-0.4584117		-0.419094	2.00683041	-0.2900812	-0.7680203
2023-2024	0.03316845	2.28873098	-0.4979819		-0.3558266	2.29471531	-0.2900812	-0.7680203
2024-2025	0.06848939	2.45566296	-0.4686024		-0.4225579	2.343153	-0.2900812	-0.7680203
2021-2022	-0.2693234	0.26241327	-0.4637404		0.17698649	-0.4822999	-0.0628025	-0.7680203
2022-2023	-0.3212648	-0.3418861	-0.2657921	0.42523168	0.24196581	0.13781879	-0.1721242	-0.6625738
2023-2024	-0.2556669	-0.4497603	-0.1815838	4.11938988	0.22356885	-0.1695588	-0.1607628	-0.749473
2024-2025	-0.2983554	-0.5051213	-0.1999104	0.01540825	0.25683263	0.29944023	-0.1457208	-0.6337347
2021-2022	-0.2249112	0.08668401	-0.2901147	-0.3767634	0.17988174	-0.2101474	-0.2877045	-0.2072173
2022-2023	-0.2072881	0.2205134	-0.3018381	-0.3432564	0.14669916	-0.0969618	-0.2900812	-0.2612706
2023-2024	-0.2892029	0.3647505	-0.4405631	-0.3177029	0.19288614	0.13661699	-0.2877572	-0.2162621
2024-2025	-0.2556244	0.15954929	-0.4302542	-0.3128396	0.2345824	0.00044086	-0.2877009	-0.2979804
2021-2022	-0.0740126	0.51539896	-0.4114542	-0.0422654	0.07874969	0.28697175	-0.2618588	-0.1531026
2022-2023	-0.0868989	0.67755473	-0.4088359	-0.0421395	0.02225601	0.251399	-0.2595704	-0.0869262
2023-2024	-0.1786228	0.24516658	-0.4564476	-0.1218056	0.17525057	0.24616344	-0.2375483	-0.1829599
2024-2025	-0.2219545	0.18020779	-0.4834129	-0.1474633	0.21394863	-0.0866159	-0.256701	-0.2393313
2021-2022	-0.1243933	1.49113	-0.3722851		-0.2433214	1.34387541	-0.2747974	-0.7680203
2022-2023	-0.2546099	1.69486606	-0.4869571		-0.2496057	1.56560448	-0.2943825	-0.7680203
2023-2024	-0.3112306	1.59427932	-0.4631086		-0.233453	1.64674969	-0.2894349	-0.7680203
2024-2025	-0.2843372	1.5232868	-0.456183		-0.2136431	1.66957163	-0.2892611	-0.7680203
2021-2022	-0.0303417	0.47784709	-0.2275798		-0.0390118	0.35723529	-0.3100432	-0.7680203
2022-2023	-0.1832738	1.13519007	-0.2529533		-0.2197262	0.68360092	-0.2887787	-0.7680203
2023-2024	-0.2090383	1.25008092	-0.3132052		-0.2184822	1.30066066	-0.2885498	-0.7680203
2024-2025	-0.2008022	1.00425253	-0.3222645		-0.1383004	1.27343408	-0.2785121	-0.7680203
2021-2022	-0.194546	-0.826606	-0.6161894	-0.5050627	0.60740749	-0.6370126	0.30161063	0.32506459
2022-2023	-0.1828245	-1.1156729	-0.466232	-0.5157403	0.5874996	-0.8677601	-0.1172916	-0.2110849
2023-2024	-0.1706677	-1.234459	-0.562608	-0.5255773	0.67878741	-0.9612801	0.22620912	-0.0589326
2024-2025	-0.1893379	-1.2386309	-2.7630187	-0.5242682	12.9846093	-1.0331435	0.48897324	-0.2468168
2021-2022	-0.3708298	0.7975907	-0.6371434	0.02066858	0.15338068	0.91234693	-0.2899359	-0.5421515
2022-2023	-0.4245596	1.10696652	-0.7374352	1.24978104	0.11667439	1.3230519	-0.2900812	-0.6822512
2023-2024	-0.3997022	1.11443933	-0.7535172	4.46789473	0.11816701	1.32512637	-0.2900812	-0.7347616
2024-2025	-0.3037907	1.35191999	-0.816419	5.84014301	0.10289456	1.48707341	2.94756409	-0.7378099

PACS_Code	Year	Z_CAP	Z_FAR	Z_MG	Z_DG	Z_LG	Z_BG	Z_PG
119	2021-2022	0.0120829	0.20448197	-0.0698194	-0.1532725	-1.03401	-0.09092	-0.23271
119	2022-2023	0.03303429	0.31035249	-0.1833245	-0.1458288	-1.12598	-0.09995	-0.27662
119	2023-2024	-0.0076857	0.30483286	-0.11823	-0.0470362	-0.75959	-0.10178	-0.19283
119	2024-2025	0.01925895	0.43985683	-0.1876521	-0.1726964	-0.65605	-0.09833	-0.21802
120	2021-2022	0.9303286	-1.0288275	-0.1754049	-0.0562691	2.198692		-0.26286
120	2022-2023	0.9110938	-0.9758651	-0.1771764	-0.0341989	1.497775		-0.31014
120	2023-2024	1.30052176	-0.9427715	0.72335705	-0.3040313	-0.05244		-0.21816
120	2024-2025	1.21158802	-0.9559239	-0.8498432	-0.0300351	0.492392		0.139326
121	2021-2022	-0.2554879	0.95313206	-0.1560848	-0.1065503	0.565736	-0.09365	-0.2395
121	2022-2023	-0.2635281	1.24029771	-0.1842812	-0.1700461	-0.56914	-0.09157	-0.281
121	2023-2024	-0.2369569	-0.3586507	-0.1565403	-0.2889175	-1.22921	-0.08721	-0.2387
121	2024-2025	-0.291284	1.53838387	-0.4149603	-0.2364469	-0.0168	-0.09063	-0.18574
122	2021-2022	-0.3718417	-0.9192667	-0.1771138	-0.1515221	-0.65546	-0.09442	-0.16667
122	2022-2023	-0.3417122	-0.9134968	-0.0076425	-0.2076818	-0.31254	-0.09458	0.07264
122	2023-2024	-0.2615899	-0.8700945	-0.1650442	-0.3020506	-0.3482	-0.08998	-0.21759
122	2024-2025	-0.2884412	-0.8702313	-0.1679815	-0.2021647	-0.40184	-0.0902	-0.26292
123	2021-2022	0.59918619	-0.5621833	-0.1648773	-0.0374787	0.326231	-0.09117	-0.15101
123	2022-2023	0.77941267	-0.458156	0.34367821	2.78629528	-1.18664	-0.09973	-0.22572
123	2023-2024	0.93472399	-0.2176926	-0.1428294	-1.0914983	-2.25967	-0.10317	-0.22932
123	2024-2025	0.40411954	-0.4328948	-0.163243	0.38274288	0.627276	-0.08945	-0.23467
201	2021-2022	-0.0191781	-0.7060409	-0.1009801	0.00353199	-0.0652	-0.08368	0.260046
201	2022-2023	0.01119751	-0.7813699	-0.0951389	0.12895079	0.252386	-0.11886	-0.23549
201	2023-2024	0.47757362	-0.7716569	-0.0046334	-0.0583412	0.789865	-0.07526	-0.17257
201	2024-2025	0.52405256	-0.8062976	-0.121146	0.03081555	1.213625	-0.10403	-0.30841
202	2021-2022	-0.1087355	-0.2740457	-0.0627788	0.01343673	0.28458	-0.07469	-0.05477
202	2022-2023	-0.0435245	-0.2943235	-0.0723163	-0.0955069	0.361051	-0.09609	-0.20752
202	2023-2024	0.02790153	-0.3342551	-0.1071325	-0.1038134	0.741602	-0.09152	-0.12746
202	2024-2025	-0.0537925	-0.3914737	-0.098485	0.03368451	0.077888	-0.09442	-0.2969
203	2021-2022	-0.1613414	-1.2500163	-0.1821071	-0.0573321	0.840873	-0.00615	-0.16869
203	2022-2023	-0.128001	-1.0081379	-0.1863439	-0.0713982	-0.15721	-0.1058	0.468271
203	2023-2024	-0.1075222	-1.0166856	-1.2935052	-0.1216388	0.123891	-0.09406	1.993359
203	2024-2025	-0.1666626	-0.9418922	6.15909433	-0.0749269	-0.10133	-0.05285	0.179414
204	2021-2022	-0.5627985	-0.7740418	-0.1692848	0.21666676	-0.17897	-0.04052	0.150256
204	2022-2023	-0.5895848	-0.6323763	-0.1708219	-0.0232955	0.649947	-0.09394	1.354835
204	2023-2024	-0.5951222	-0.6463906	-0.0915735	-0.117427	0.743794	-0.09678	-0.10424
204	2024-2025	-0.6164804	-0.6617528	-0.1680218	-0.0623321	-0.30963	-0.14214	-0.22801
205	2021-2022	-0.4525383	-0.8021956	-0.1984712	-0.0158325	0.507231	-0.04862	-0.28704
205	2022-2023	-0.4701456	-0.7213495	-0.2940646	0.01650494	0.82808	-0.11352	-0.11509
205	2023-2024	-0.4739739	-0.7490395	-0.2042324	-0.0701691	0.648857	-0.09271	-0.27278
205	2024-2025	-0.4800723	-0.678382	-0.2008738	-0.0128245	1.149729	-0.09105	-0.26611
206	2021-2022	0.2021329	-0.8180753	1.698072	0.0550207	0.275876		-0.27622
206	2022-2023	0.17238639	-0.8436061	-0.0619776	0.01487782	0.694411		-0.0742
206	2023-2024	0.25675272	-0.5947126	-0.0656628	-0.1040951	0.562722		-0.28267
206	2024-2025	0.14170817	-0.6627007	-1.2938315	0.06335018	-0.07116		-0.19488
207	2021-2022	-0.4197496	-0.8169356	6.38833396	0.10696773	1.120598		5.146908
207	2022-2023	-0.3562459	-0.8042598	-0.1168118	0.01560943	1.201181		0.783314
207	2023-2024	-0.3209315	-0.737684	-0.1192874	0.04245577	0.502092	-0.13223	-0.30821
207	2024-2025	-0.2615755	-0.75073	-0.1198968	-0.131465	0.14921	0.244404	-0.09923
208	2021-2022	0.04333817	-0.7711231	-0.1339082	-0.0293144	0.026023	-0.08521	0.336212
208	2022-2023	0.0531599	-0.7552551	0.38112874	0.00330292	0.118899	-0.09442	-0.27648
208	2023-2024	-0.0818336	-0.8084512	-0.0896065	0.05731057	1.082239	-0.08924	-0.27034
208	2024-2025	-0.0562948	-0.8541037	-0.0938996	0.05913737	0.939206	-0.09499	-0.19343
209	2021-2022	-0.6650306	-0.3222864	-0.1216383	-0.0963087	0.793405	-0.09442	-0.25108
209	2022-2023	-0.672037	-0.0839079	-0.1253199	0.11541838	0.624678	-0.0801	-0.26754
209	2023-2024	-0.6270809	-0.1292375	-0.1255246	-0.1045743	0.98332	-0.09603	-0.27223
209	2024-2025	-0.5558633	-0.2232082	-0.140171	-0.0273283	0.56136	-0.08895	-0.19437
210	2021-2022	-0.3342184	-0.7632186	-0.1622067	-0.0616222	0.07485		-0.21278
210	2022-2023	-0.3196522	-0.4790491	-0.1308309	-0.1096586	-0.33924		-0.22187
210	2023-2024	-0.3229052	-0.4834429	-0.0637634	-0.1138271	-0.03024		-0.10008
210	2024-2025	-0.3312129	-0.5008846	-0.1281075	-0.0940444	0.131618		-0.28686
211	2021-2022	-0.1494059	-0.5537273	-0.1344315	-0.0151709	0.357986		0.061559
211	2022-2023	-0.2908891	-0.6815697	-0.1434604	0.1517527	-0.40801		1.705227
211	2023-2024	-0.2863808	-0.7129533	-0.134115	-0.0717256	0.053566		0.560819
211	2024-2025	-0.2967468	-0.7388699	-0.1218913	-0.0881509	0.741968		-0.29475
212	2021-2022	0.25226964	-0.4342484	0.7577392	-0.0921706	-0.3179	-0.02716	0.449773
212	2022-2023	0.45249965	-0.3345381	-0.0904211	-0.3323845	-0.18108	-0.11319	-0.25528
212	2023-2024	0.51076794	-0.3163169	-0.0797682	-0.1571215	0.046269	-0.07894	-0.28564
212	2024-2025	11.9254626	-0.3301574	-0.8897725	-0.0499631	-0.18127	-0.10712	-0.18361
213	2021-2022	0.21803331	-0.2076534	-0.1779445	-0.0617287	-0.1419	-0.04061	10.11871
213	2022-2023	0.18313357	-0.2757562	-0.1660038	-0.0480073	-0.43657	-0.12394	-0.00218
213	2023-2024	0.09552944	-0.3191398	-0.1646248	-0.070422	-0.07457	-0.12409	-0.06559
213	2024-2025	0.03005434	-0.3768824	-0.0814811	-0.0922666	-0.1863	-0.09924	0.953936

Annexure VI

Mean GLOSP Index – Profit PACS vs Loss PACS

Group	Mean_GLOSP_Index	SD
Profit PACS	0.091472699	0.286249358
Loss PACS	-0.05170196	0.386367159

Annexure VII

How to Compute the GLOSP Index: A Step-by-Step Guide

This guide outlines the systematic procedure for computing the GLOSP (Growth–Liquidity–Operational Efficiency–Solvency) Index for evaluating the performance of Primary Agricultural Credit Societies (PACS). The procedure is designed to ensure transparency, comparability, and replicability across institutions and time periods.

Step 1: Selection of Financial Indicators

Identify relevant financial indicators for each PACS under four performance dimensions:

- Growth (G): e.g., deposit growth, loan growth, business expansion indicators
- Liquidity (L): e.g., cash ratio, working capital ratio
- Operational Efficiency (O): e.g., operating efficiency ratio, cost indicators
- Solvency (S): e.g., capital adequacy proxy, debt–equity ratio

Let X_{ijt} denote the value of indicator j for PACS i in year t.

Step 2: Directional Adjustment of Indicators

For indicators where higher values represent adverse financial conditions (e.g., operating cost ratio, leverage ratios), reverse the direction prior to standardisation to ensure interpretive consistency. After adjustment, higher values should uniformly represent better performance.

Step 3: Z-Score Standardisation

Standardise each indicator using Z-scores to remove scale effects and enable comparability:

$$Z_{ijt} = \frac{X_{ijt} - \mu_j}{\sigma_j}$$

where:

- μ_j =sample mean of indicator *j*
- σ_j =sample standard deviation of indicator *j*

Positive Z-scores indicate above-average performance, while negative values indicate below-average performance.

Step 4: Construction of Dimension-Wise Indices

Compute dimension-wise indices as the simple average of Z-scores of indicators belonging to each dimension:

$$GIndex_{it} = \frac{1}{n_G} \sum Z_{G,ijt}$$

$$LIndex_{it} = \frac{1}{n_L}\sum Z_{L,ijt}$$

$$OIndex_{it} = \frac{1}{n_O}\sum Z_{O,ijt}$$

$$SIndex_{it} = \frac{1}{n_S}\sum Z_{S,ijt}$$

where n_G, n_L, n_O, n_Sdenote the number of indicators under each dimension.

Step 5: Computation of Composite GLOSP Index

Aggregate the four dimension-wise indices to obtain the Composite GLOSP Index:

$$GLOSP_{it} = \frac{1}{4}(GIndex_{it} + LIndex_{it} + OIndex_{it} + SIndex_{it})$$

The composite index represents the overall multidimensional performance of PACS *i* in year *t*.

Step 6: Performance Interpretation and Analysis

The Composite GLOSP Index may be used for multiple analytical purposes:

- Ranking and classification of PACS
- Stability analysis using year-wise ranks
- Profitability validation through correlation or regression
- Quadrant analysis combining GLOSP performance and profitability outcomes

Positive composite values indicate above-average institutional performance, while negative values indicate below-average performance.

Note on Applicability

The GLOSP computation framework is flexible and can be extended by incorporating additional indicators or dimensions, subject to data availability and research objectives. The model is suitable for cross-sectional, panel, and comparative studies in cooperative banking and related sectors.

Annexure VIII

Demonstrative PACS Case Profiles Based on GLOSP Performance

Panel A. Selection Statement

The PACS included in this annexure are selected solely to represent each quadrant of the GLOSP–Profitability classification. The profiles are demonstrative in nature and are intended to demonstrate the application of the GLOSP framework rather than to draw additional empirical generalizations. These are demonstrative applications and do not constitute additional empirical testing.

Panel B. PACS-Level GLOSP Case Profiles

Dimension-wise and Composite GLOSP Indices

Item	PACS–A	PACS–B	PACS–C	PACS–D
Quadrant Classification	High GLOSP – High Profit	High GLOSP – Low Profit	Low GLOSP – High Profit	Low GLOSP – Low Profit
PACS Code	104	107	203	111
Composite GLOSP Index	0.583	0.516	−0.168	−0.209
Growth Index (GIndex)	1.026	0.462	0.355	−0.198
Liquidity Index (LIndex)	1.221	0.122	0.042	−0.188
Operational Efficiency Index (OIndex)	−0.287	1.504	−0.482	−0.337
Solvency Index (SIndex)	0.373	−0.023	−0.588	−0.112
Profitability Status	Profit	Loss	Profit	Loss
Composite GLOSP Rank	1	2	34	36

Panel C. Dimension-wise Diagnostic Interpretation

Qualitative Diagnostic Summary

Dimension	PACS–A (104)	PACS–B (107)	PACS–C (203)	PACS–D (111)
Growth	Strength	Strength	Moderate	Weakness
Liquidity	Strength	Moderate	Weakness	Weakness
Operational Efficiency	Moderate	Strength	Weakness	Weakness
Solvency	Strength	Moderate	Weakness	Weakness
Overall Diagnosis	Sustainable & resilient	Structurally sound but profit-constrained	Profit-driven but structurally weak	Structurally weak and distressed

Panel D. Directional Performance Trends

Trend Summary

PACS Code	GLOSP Trend	Profitability Trend
104	Improving	Stable
107	Stable	Declining
203	Volatile	Stable
111	Declining	Declining

Notes: The PACS profiles are demonstrative applications of the GLOSP framework and are not intended for inferential generalization. PACS selection is based on quadrant representation, not extremity of performance alone.