

## Optimization of Cost And Management Accounting or Multipurpose Primary Agricultural Cooperative Societies

Navneet Kumar Jain  
Research Scholar  
Lingaya's Vidyapeeth, Faridabad,  
Haryana  
[navneetic@yahoo.com](mailto:navneetic@yahoo.com)

Dr. Krishan Kumar Garg  
Professor, Department of Management,  
Lingaya's Vidyapeeth, Faridabad,  
Haryana  
[drgargkrishan@gmail.com](mailto:drgargkrishan@gmail.com)

**Abstract:** - Indian Multipurpose Primary Agricultural Cooperative Societies (MPACS) are an important element of rural finance and agribusiness. These entities normally do not adhere to standardized Cost Management Accounting (CMA) system. They provide weak financial controls, disorganized reporting and low accountability. In this backdrop it is imperative to study the accounting process followed by such MPACS and suggest a forward-looking approach. This study evaluates the applicability of a composite CMA model to enhance transparency, accountability, and financial sustainability in such MPACS. The study adopted a cross-sectional research methodology. The economic data from 72 MPACS across three states of India were analyzed using regression and structural equation modeling (SEM). The proposed model had undergone for validation by the experts in the cooperative sector. Findings demonstrate that the adoption of technology, the presence of qualified accountants and the involvement of management plays an important role in achieving effective use of cooperative management. The application of CMA leads to greater cost effectiveness, profitability, and transparency in the governance. The proposed model is in alignment regulatory reforms of NABARD. This model can be used in rural contexts of different settings. These findings provide practical approach to policymakers and cooperative leaders to institutionalize CMA systems. It will strengthen financial discipline, ensure accountability, and promote the long-term sustainability of India's cooperative sector.

**Keywords:** *Cost and Management Accounting (CMA), Multipurpose Primary Agricultural Cooperative Societies (MPACS), Financial Administration, Cooperative Management;*

### A. INTRODUCTION

Multipurpose Primary Agricultural Cooperative Societies (MPACS) are a vital component of India's rural socio-economic landscape, providing services to small and marginal farmers in the form of credit, procurement, raw material supply, storage, and marketing. However, as these societies expand their business operations, maintaining financial transparency, operational efficiency, and accountability becomes a challenge. The unusual financial reporting and poor internal control framework are the usual causes of the deficit of a conventionalized cost and management accounting (CMA) framework, disrupting financial sustainability and control. The research indicates that agricultural cooperatives play a significant role in increasing the collective action by organizational

management structures, financial discipline and rural sustainability [1]. The efficiency and long-term viability of cooperatives depend on their ability to integrate cost-efficient accounting systems and take advantage of economies of scale [2]. Systematic management approaches enable cooperatives to improve decision-making and resource allocation, which has a direct impact on profitability and the welfare of members [3].

Within India's rural development agenda, it is becoming increasingly important to align cooperative financial practices with national priorities such as Atmanirbhar Bharat, sustainable agriculture, and inclusive growth. At the grassroots level, however, the integrated CMA model has not been adequately implemented [4]. However, the efforts of implementing the integrated CMA model at the grassroots level have been scarce. A streamlined and centralized accounting framework could serve as a strategic tool for MPACS to improve operational coherence, attract institutional support, and achieve sustainable development.

This study is to design and test hybrid CMA for cooperative management model for MPACS in India. The foundation for the model is financial analysis of cooperatives entities validated by the qualified experts, and other stake holders. The model is adapting international principles and best practices in cooperative management tuning with India's socio-economic conditions.

### A. Problem Statement

*Multipurpose Primary Agricultural Cooperative Societies (MPACS)* in India has critical role in rural credit distribution, input supply, procurement, and marketing services. Yet sometimes they employ below standard and ineffective financial management systems. The developed economy has implemented sophisticated management accounting frameworks for decision-making, but such models are largely absent in India. Their inconsistencies in financial reporting, ineffective cost management, and inefficient decision-making are mainly due to lack of an integrated *Cost and Management Accounting (CMA)* framework. The MPACS are classified into different business sectors, but their financial information is not integrated, consequently they lack accountability. Empirical studies also indicate that cooperatives with structured CMA poses high level of

operational efficiency and economies of scale [2]. On the other hand, poor accounting systems lead to loss of profits, liquidity and ineffective internal controls [3].

### B. Research Questions

Based on the problems statements, this study attempts to address the following research questions.

1. *How does the absence of standardized CMA systems impact efficiency and sustainability of MPACS?*
2. *What are the key components of an integrated CMA model?*
3. *Upto what extent standardized CMA framework enhances transparency, accountability, and financial discipline in MPACS?*

### B. LITERATURE REVIEW

Multipurpose agricultural cooperatives significantly improve member production and income, but are hampered by weak governance, lack of leadership, and insufficient capital [5]. These constraints can be seen to be primarily as a result of the absence of institutional regulation and an integrated management accounting framework, which might make accountability better. These gaps have resulted in reliance on institutions as weak incentives of cooperation and financial instability due to the deficiencies in governance, including fund misuse, absence of transparency and bureaucratic inflexibility [6]. These results demonstrate that cooperatives are still structurally feeble when they do not have institutional frameworks that drive transparency, accountability, and competency-based leadership.

The same issue of governance in the cooperative credit structure is presented in Indian studies. The high-performance of PACS was attributed to the use of accountable structures and active participation of the members in the governance system [7]. The institutional flexibility enabled the future sustainability of the cooperatives that have been transformed by the state-inspired institutional frameworks instead of the member-based system of governance[8].

The strategic decision-making process and risk management have been transformed by the use of technology in accounting, decision-making and reporting in different countries [9]. Management accounting data supported by digital tools has become a key aspect of the strategic decision-making process and risk mitigation (Ahmed et al., n.d.).Despite the fact that majority of the cooperatives had implemented computerized accounting systems, they were yet to overcome some constraints like poor marketing infrastructure, deficiency of cooperative expertise and insufficient provision of technical support [10].

From a theoretical point of view, management accounting is an integrated information system for production management and decision support [11]. The proposed model for agricultural enterprises in Eastern Europe proposes integrated cost nomenclature and digital accounting processes to monitor material, labor and biological costs in real time [11]. Research has concluded that computerized accounting improves cost control, profitability analysis, and sensitivity to environmental uncertainties. Indian cooperatives are also moving toward a digital ecosystem. In India the digital transformation of multipurpose cooperative societies (MPCS) is increasing. The technology adoption improves efficiency in loan distribution, crop procurement, and market operations [12]. They, however, also found governance weaknesses and technology resistance to be hindrances to digital integration.

An economic diversification is another important feature of multipurpose cooperatives, and it helps to reduce risks and make them more financially stable. The viability analysis of diversified and non-diversified PACS has been compared, and it was found that cooperatives with multi-purpose generate more income, are much financially stable, and capable of mobilizing resources [13]. The Balanced Scorecard (BSC) framework of multidisciplinary cooperatives can be used to evaluate the performance of any given organization in terms of financial, customer, internal process, and learning planes [14]. Cost management accounting is the foundation of diversification strategies in any given enterprise that need to Likewise, Indian cooperatives like IFFCO, AMUL and KRIBHCO have been successful in their diversification, training the members and vertical integration, and they can be regarded as examples of MPACS that are interested in expansion [15].

There is a strategic purpose of infrastructure and resource management in the scalability and sustainability of cooperatives. The study determined that a weak infrastructure (poor storage capacity and poor connectivity) is associated with inefficiency in supply chain management [16]. Lack of professional approach, and political interference are also the factors of inefficiencies in the functioning of Indian cooperatives [17]. Apart from India, Russia's agricultural sector reform emphasizing to integrate bankrupt farms and successful agribusinesses through cooperative structures [18]. At a broader level, India's cooperative modernization efforts are part of Viksit Bharat mission [19]. Study also arguing that modern infrastructure, with management accounting reforms, positions cooperatives as a key vehicle for inclusive national development [11]. While modern economy has developed sophisticated management accounting frameworks for decision-making, such models are largely absent in India [20]. Only a few Indian studies have combined the elements

of governance and performance within an integrated CMA framework [7], [21]. Despite policy efforts by NABARD and the Ministry of Cooperation, there has been few empirical validations of standardized cost models for multi-sector cooperatives [16].

#### A. Research Gaps

The available literature highlights serious shortcomings in the integration of cost and management accounting into multipurpose agricultural cooperatives. Studies shows there is lack of consensus on financial management and governance. Even the digital accounting systems for cooperative diversification has no empirical support. Governance reforms emphasize accountability without considering cost-based performance parameters. There is no study on the relationship among infrastructure, resource optimization and financial reporting mechanisms. These shortcomings highlight the need for an integrated, context-specific cost accounting system by incorporate regulation policy, digital transformation, and financial sustainability in Inian scenario.

#### C. RESEARCH OBJECTIVE

Taking note of the stated problems, identified research gaps and research questions, the following objectives have been listed out for this study:

1. Analyze MPACS' current cost and management accounting practices.
2. Identify deficiencies in financial reporting, control and performance evaluation mechanisms.
3. Design and validate an integrated CMA framework suitable for the multipurpose functions of MPACS.

#### D. CONCEPTUAL FRAMEWORK

This conceptual model is based on three theories, of the stakeholder theory, cooperative governance theory, and the contingency theory of management accounting. These theories together show how contextual factors, participatory governance, and stakeholder alignment impacts the model design and its effectiveness to CMA practices. It makes MPACS more open, accountable, and financially stable.

*Stakeholder Theory:* This theory states that the success of an organization is based on the idea of balancing the interests of its stakeholders [22]. CMA system, provides clear financial data for neutral decisions making. By involving stakeholders, it will bring more transparency and reliability in data.

*Cooperative Governance Principles:* This theory advocates the participation of members, democratic control, and collective responsibility [5]. Lack of these possess irregularities, poor management mechanisms and financial illiteracy [5].

*Contingency Theory of Management Accounting:* According to this theory, the effectiveness of any accounting system depends on the circumstances, such as the size of the organization, the level of technology as well as environmental uncertainty [16]. This theoretical approach indicates that contingency factors should be incorporated into the model. CMA systems can be to change to accommodate unique institutional and socio-economic environment of MPACS.

This framework ensures the elements of contingency, CMA practices, stakeholder participation, and organizational performance to make it transparent, accountable, and economically viable.

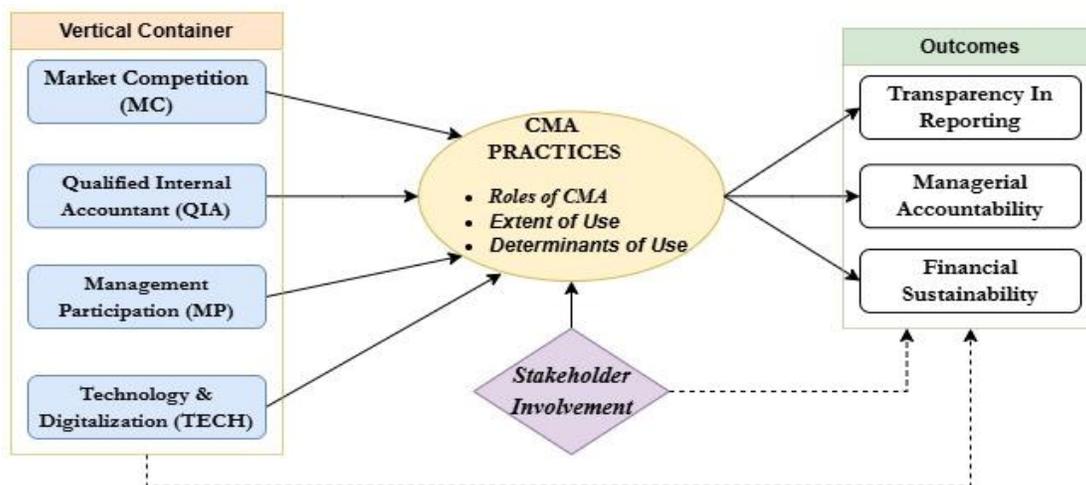


Figure 1: Conceptual Model

The external and internal conditions as part of contingency factors also influence the CMA practices. Market competition, qualified internal accountants, technological development are identified as the important factors for system maturity. The design and effectiveness of model also depend on environmental, technological, and organizational contingencies [23]. Similarly, flexibility for adopting innovation are important for the systems to become implementable [24]. With trained accountants and participatory management in cooperatives proper cost monitoring is maintained and it assists in decision making on behalf of the members [25].

The most important part of this framework is cost and management accounting (CMA) techniques which consist of planning, budgeting, cost control, performance analysis and variance monitoring. These tools present important data to estimate the performance and balance organizational operations with the strategic goals [26]. CMA systems combine financial and non-financial metrics, allowing the cooperatives to balance costs and fulfill the social objectives. According to Langfield-Smith (2008) management accounting does not only stabilize but also acts as a strategic partner in decision-making and innovation which is an immensely pertinent consideration to the cooperatives aiming to achieve sustainable development [27].

*Stakeholder Participation:* It is an intermediary structure, which links CMA practices and collaborative results [22]. According to the stakeholder theory, which was developed by Freeman, stakeholders can be members, employees, regulators and the community, and their interests need to be reconciled by means of transparent information sharing [22]. The participatory financial governance helps in agricultural cooperatives strengthen the spirit of collaboration by allowing stakeholders to be more accountable and trusting to each other [28]. Active participation of stakeholders ensures that the information received by the CMA is accurate. It imparts into fair and democratic decision-making process.

An effective CMA will represent the intended consequences of integration. Transparency is improved by means of proper and prompt financial reporting [29]. Evaluating managers' performance using reliable financial indicators strengthens accountability [30]. Cooperatives use CMA tools for cost optimization, revenue diversification, long-term planning, and sustainability [31]. All these outcomes improve the governance quality and credibility of cooperatives, thereby increasing trust and resilience.

#### E. RESEARCH METHODOLOGY

This paper uses a quantitative cross-sectional research methodology to design and validate integrated cost and management accounting (CMA) in multipurpose primary

agricultural cooperative societies (MPACS) in India. The cross-sectional methodology allows for simultaneous analysis of financial and operational data from multiple cooperatives and determine trends in accounting practices, governance efficiency, and financial sustainability. The sampling frame consisted of MPACS registered in the district cooperative offices and programs assisted by NABARD. Stratified random sampling was employed so that the representation is made across geographic regions, size and business diversification. Approximately 60-80 MPACS were selected from three Indian states with significant cooperative activity. Selection criteria included: (a) at least five years of continuous operation, (b) available audited financial statements for at least three consecutive years, and (c) engagement in multiple business functions (credit, input supply, warehousing, or retail).

Data sources included annual reports, audited financial statements, and the Cooperative Performance Database provided by NABARD and the Registrar of Cooperative Societies (RCS). In order to contextualize the quantitative findings, the complementary sources of information with a qualitative character were employed, such as semi-structured interviews and focus group discussions with cooperative managers and other stakeholders of cooperative sector. Data analysis was conducted using descriptive statistics to evaluate financial trends, and inferential statistics using multiple regression and structural equation models (SEM) to test hypothesized relationships between contingency factors, CMA practices, and organizational outcomes. Model reliability was determined through the use of Cronbach alpha and composite reliability indices and structural validity through the use of confirmatory factor analysis (CFA).

Triangulation which was used in expert consultation also increased the validity and practice applicability of results. Nevertheless, it has certain limitations, such as possible reporting differences and differences in MPACS across regions, which could affect the overall generalizability. Despite these limitations, this design provides methodological rigor and makes the study applicable to cooperative financial governance in India.

#### F. ANALYSIS AND RESULTS

This paper analyzed financial and operational data from 72 multipurpose primary agricultural cooperative societies (MPACS) in Maharashtra, Karnataka, and Odisha for the financial year 2019-24. Variables included are operating income, cost structure, surplus, governance indicators, and digital adoption rates. NABARD's cooperative classification criteria were used to classify MPACS based on size. These included 28 small societies with assets less than ₹2.5 crore and fewer than 500 members, 26 medium societies with

assets between ₹2.5-6 crore and up to 1,000 members, and 118 large societies with assets greater than ₹6 crore and more than 1,000 members. Descriptive statistics can be summarized in Table 1.

#### A. Descriptive Statistics

The descriptive statistics in Table 1 show that MPACS have a moderate operating asset base and revenue base, with average operating assets and revenues of ₹42.6 million and ₹27.1 million, respectively. Their operating cost ratio is around 71, resulting in an average surplus margin of 8.7%. Variations in the digital adoption index (0.48) and governance transparency score (64.2) reflect uneven modernization and governance practices.

With the increasing digitization, integration and transparency of cooperatives the largest they are, the adoption of technology raises the accountability, operational efficiency, and trust in the cooperatives among members. The trend explains the increasing digital gap in MPACS and the value of technology-based financial management to enhance the performance of the governance in the Indian cooperative sector.

#### B. Cost Behavior Patterns and Efficiency Indicators

Breaking down cost structures, it was found that the proportion of variable costs (procurement, transportation, and utilities) comprised 63 percent of the total spending, with 37 percent of total spending being fixed costs (administration, depreciation and salaries). Using cost-volume-profit (CVP) analysis, the study found that cooperatives break even at revenues of ₹22 million on

TABLE I: DESCRIPTIVE STATISTICS DATA

variables	Meaning	SD	Min	Maximum
Net Worth (₹ Million)	42.6 (Revenue)	18.2	11.3	95.6
Annual Revenue (₹ million)	27.1 (Revenue)	12.7	7.4	63.3
Operating Cost (%)	71.3	10.7	54.2	88.8
Surplus Margin (%)	8.7 %	4.19	1.3	19.7
Digital Adoption Index (0-1)	0.48	0.20	0.12	0.93
Governance Transparency Score (0-100)	64.2	14.71	38.4	92.3

average, and profitability improves rapidly beyond this threshold.

Cost-revenue analysis reveals a clear positive relationship between the size of MPACS and financial efficiency big cooperatives are also making more revenue (₹ 39.5 million) than costs (₹ 33.1 million), and hence have a surplus of 12.9 percent, whereas the small MPACS have a surplus of only 5.2 percent. This suggests that economies of scale, better managerial capabilities, and diversified operations enable

TABLE II: COST-REVENUE RELATIONSHIP DEPENDING ON THE SIZE OF THE MPAC

Social class	Average Total Cost (₹ million)	Average Revenue (Million ₹)	Surplus Margin (%)
Small	18.5	20.1	5.2
Medium	23.8	27.4	8.6
Big	33.1	39.5	12.9

large cooperatives to more effectively control costs and increase profitability. The Medium MPACS shows moderate efficiency (8.6%). It shows a gradual improvement with size. These findings indicate that expansion, professional management, and cost-efficient play a significant role in Indian cooperative's sustainability.

TABLE III: DATA FOR MULTIPLE REGRESSION

Predictor Variable	Beta (β)	t value	p-value
market competition	0.23	2.81	0.006
qualified accountant	0.31	3.92	0.001
Management Partnership	0.27	3.16	0.003
Technology adoption	0.34	4.52	0.000

To determine the dependence on contingency factors including competition in the market, the availability of qualified accountants, managerial participation, and the use of technology, a multiple regression equation was estimated to examine the relationship between the extent of CMA utilization and contingency factors. The model was found to be statistically significant ( $R^2 = 0.68$ ,  $p < 0.01$ ).

The findings of the regression analysis show that all four of the factors have a significant effect on the adoption of cost and management accounting (CMA) practices among MPPACS, and the explanatory power of the model is rather high. Technology adoption ( $b = 0.34$ ) is believed to be the most influential one and the next factor is the availability of competent accountants ( $b = 0.31$ ) which should be taken as a significant factor towards better financial management. Management participation with  $\beta = 0.27$  and market competition with  $\beta = 0.23$  also contribute positively. Which

suggests that accountability practices and market forces encourage accounting innovation. All these factors will improve the transparency, efficiency, and financial sustainability of Indian cooperatives.

Efficiency analysis was used to evaluate the effectiveness of MPPACs. It converts inputs to outputs, identify performance gaps, and assess operational expansion potential. DEA results as shown in table- IV indicate that most MPPACs (57%) operate under increasing returns to scale (IRS). Which indicates that there is immense potential for expansion through improved resource utilization and process efficiency. As shown in Table-IV, approximately 26% of cooperatives have achieved stable returns (CRS). That means there exists sustained and growing performance. Nevertheless, 17% of cooperatives are facing diminishing returns (DRS), due to administrative inefficiency misgovernance. These findings suggest that MPPACS performance in India is skewed, and certain management reforms, capacity-building, and cost-cutting interventions are necessary to take low-performing cooperatives to optimal operating performance.

*C. Variance Analysis and Cost Control Methods:*

To identify the efficiency of the cost management, variance analysis was based on 5 cost types (purchases, labor, utilities, administration, and depreciation). Table-II summarizes the average cost variances.

Procurement and utilization were the only variables that showed the most desirable differences, which were related to price volatility and vendor management inefficiencies. Cooperatives with integrated CMA systems recorded a 38% reduction in average cost overruns compared to cooperatives without a formal accounting model, highlighting the importance of continuous gap monitoring.

TABLE IV: EFFICIENCY ANALYSIS USING DATA ENVELOPMENT ANALYSIS (DEA)

returns to scale category	Number of MPACs	Percentage (%)
Increasing returns to scale (IRS)	41	57
Constant returns to scale (CRS)	19	26
Diminishing returns to scale (DRS)	12	17

Surplus margin and governance transparency are examples of key performance indicator (CMA) reporting. This approach is appropriate because it does not assume a causal relationship between changes in one variable (e.g., frequency of CMA reports) and changes in another variable (e.g., financial or governance performance). In the context of MPACS, correlation analysis is helpful in identifying

performance relationships between accounting practices and outcomes, and it provides empirical evidence that more

TABLE V: DATA OBTAINED FROM VARIANCE ANALYSIS

cost category	Standard Cost (₹ million)	Actual Cost (₹ million)	Variance (%)
Purchase	10.2	11.5	+12.7
Labor	4.8	5.1	+6.2
Utilities	2.3	2.5	+8.7
Administration	3.1	3.0	-3.2
Depreciation	1.7	1.6	-5.9

frequent CMA reporting is associated with improved financial discipline and transparency.

TABLE VI: CORRELATION COEFFICIENT

variable pair	Correlation coefficient (r)	Sig.
CMA Reporting Frequency ↔ Surplus Margin	0.62	< 0.01
CMA Reporting Frequency ↔ Transparency Score	0.71	< 0.01

The correlations and results shown in table- VI indicate a strong positive relationship between the frequency of CMA reporting and financial and governance performance indicators. MPACSs that prepared regular monthly or quarterly management reports demonstrated more adequate surplus margins and higher transparency scores. These relationships were statistically significant, as shown in table- VI (p < 0.01). This reality results in the recommendation that systematic CMA reporting can help to enhance the decision-making and accountability levels. It validates the Kaplan and Norton's (1996) approach of the balanced scorecard [31].

TABLE VII: DATA FOR GOVERNANCE AND TRANSPARENCY INDICATORS

Governance Indicators	Average Score	High performance (≥80)	Low performance (≤50)
Audit Regularity	78.4	44	9
Member Participation	64.1	27	17
Timeliness of Disclosure	59.7	21	23
Compliance with bye-laws	74.6	39	13
Composite TAI	69.3	30 (41.6%)	15(20.7%)

*D. Governance and Transparency Indicators*

The overall Transparency and Accountability Index (TAI) was used to assess operations practices and was based on the

frequency of audits, participation of members, the timeliness of disclosed information and compliance with the bylaws of the cooperative. The index ranged from 0 to 100, and higher values indicate better operation.

Governance and transparency measurements show that MPACS have relatively good audit regularity (average = 78.3) and compliance with bylaws (average = 74.6). It meaning they are complying with regulatory standards. However, poor results in member participation (64.1) and timeliness of disclosure (59.7) indicate low inclusiveness and delays in information sharing. The overall Transparency-Accountability Index (TAI) was 69.3. Only 41.7% of cooperatives rated as high performers. This disparity indicates a lack of governance maturity – although there are high levels of formal compliance, participatory and disclosure designs remain to be developed.

The results establish a strong and significant relationship between cost and management accounting (CMA) integration and the transparency-accountability index (TAI) among MPACS. Cooperatives with computerized accounting systems, regular internal audits, and structured reporting mechanisms consistently achieved higher transparency scores and fewer member complaints. Regression results ( $R^2 = 0.57$ ) confirm that more than half of the variation in governance quality is due to the degree of CMA adoption. This result supports Cornforth's (2004) assertion that information disclosure and accountability are essential for cooperative governance excellence, implying that well-organized financial management systems positively reinforce cooperative integrity and trust between parties [32].

#### E. Structural Equation Modeling (SEM)

Hypothesized pathways between contingency factors, CMA practices, stakeholder involvement, and outcomes were tested using SEM. The model demonstrated good fit indices ( $\chi^2/df = 1.93$ ; CFI = 0.94; RMSEA = 0.05).

TABLE VIII: RELATIONSHIP BETWEEN CMA INTEGRATION AND THE TRANSPARENCY-ACCOUNTABILITY INDEX (TAI)

Analysis Types	Variable(s)	Statistics /Values	Sig.
Correlation Analysis	CMA Integration ↔ Transparency-Accountability Index (TAI)	R = 0.68	< 0.01
Regression Analysis	CMA Integration → TAI	$R^2 = 0.57$	< 0.01

The SEM results confirm substantial and statistically significant relationships between the model constructs. Contingency factors, including competition, business efficiency, and digitalization, have a profound impact on CMA practices, which in turn promote transparency ( $\beta = 0.66$ ), accountability ( $\beta = 0.59$ ), and financial sustainability ( $\beta = 0.54$ ) within the MPPAC. Furthermore, stakeholder participation ( $\beta = 0.41$ ) further enhances accountability, validating Freeman's (1984) stakeholder theory and echoing the views of Birchall and Ketilson (2009), who argued that participatory governance is essential for cooperative resilience [28]. The model's excellent fit indices ( $\chi^2/df = 1.93$ ; CFI = 0.94; RMSEA = 0.05) confirm the robustness of the proposed conceptual framework linking accounting systems to cooperative governance outcomes.

#### F. Expert Consultation and Verification

12 professionals, including NABARD officials, cooperative auditors, and senior managers participated in the focus group discussions. These experts evaluated the proposed CMA framework on five criteria. These are practicality, clarity, data reliability, adaptability, and governance relevance, using a 5-point Likert scale.

Professionals acknowledged that the model is effective in terms of the combination of financial and governance points of view, and stressed that CMA is not just a control tool, but a trust-building mechanism. They suggested gradual adoption of digital, personnel preparation, and unification of

TABLE IX: RESULTS OF STRUCTURAL EQUATION MODELING (SEM)

Path relationships	Standardized coefficient ( $\beta$ )	Sig (p-value)
Contingency Factors → CMA Practice	0.72	< 0.001
Transparency in the functioning of the CMA	0.66	< 0.001
CMA Practice → Accountability	0.59	< 0.01
Stakeholder engagement → Accountability	0.41	< 0.05
CMA Practice → Financial Stability	0.54	< 0.01

policies to launch the model on a national level. Comparing with the research of Chinese cooperatives, the same tendencies are observed. The introduction of a system of accounting information and a cooperative management system result in the high level of technical efficiency, but the issues of managing the system of Indian conditions should be considered carefully [33].

TABLE X: EVALUATION WITH AVERAGE RATING

Evaluation criteria	Average rating (out of 5)
<i>Practical applicability</i>	4.6
<i>Clarity of outline</i>	4.5
<i>Data Reliability</i>	4.2
<i>Adaptability to MPACS</i>	4.7
<i>Relevance of governance</i>	4.8

Although in the efficiency gains were low owing to the institutional constraints, the current research shows that participatory governance and the acceptance of technology can address the issues of Indian environment governing [33].

#### G. Summary of Key Findings

- The level of implementation of CMA is mainly influenced by contingent factors, especially technology and the ability of professionals to perform accounting.
- CMA integration decreases the cost variances, boosting excess margins and providing the transparency in financial reporting.
- Stakeholder participation positively impacts accountability outcomes, thereby promoting the principles of collaborative governance.
- The SEM analysis confirms that both transparency and sustainability are strongly and directly influenced by the CMA practices.
- Consultations with experts confirmed the feasibility of this framework and its policy relevance for NABARD and cooperative reforms.

#### G. PROPOSED MODEL

To bring in standardization of financial management, increase transparency in governance and long-term sustainability the proposed integrated cost and management accounting (CMA) model of multipurpose primary agricultural cooperative societies (MPACS) is designed. The framework integrates five interrelated components—cost identification, budgeting, variance analysis, internal control, and reporting mechanisms—that are structured in accordance with cooperative principles of accountability and member participation, while also adapting to different state-level institutional contexts. This agricultural work demonstrates that:

- It sets standardized way of categorizing direct and indirect costs of borrowing, purchasing, warehousing and retailing operations. This step will aid in proper costing and allocation of resources.
- It encourages specific annual budgets preparation to forecast revenues, costs and surpluses. Thereby

promoting financial discipline and alignment with strategic objectives.

- Managerial intervention must be put for regular comparisons between budgeted and actual performance. Discrepancies must be identified and resolve in timely manner by optimize operations.
- Accountability must be ensured through standard audit practices of NABARD and Registrar of Cooperative Societies (RCS). There must be separation of duties and computerized accounting system.
- It promotes periodic (monthly/quarterly) CMA reports and real-time information to management, members and regulators. Which will bring transparency and data-driven decision-making.

This model has developed in perspective of local scenario and standards. It is aligned with the PACS computerization and governance reform agenda of NABARD. With the inclusion of CMA practices in statutory reporting, this model connects the role of financial control with participatory governance. It making MPPACS transparent, efficient and sustainable drivers of rural development.

#### H. DISCUSSION

The empirical results of this study provide that the integration of CMA serves as a cornerstone for improving financial transparency, managerial accountability, and sustainability in MPACS. Findings support the theoretical perspective outlined above. The study reveals the complexity of the significance of CMA as a financial control tool and a participatory governance instrument [22], [23].

Theoretically, the strong path coefficient with  $b = 0.72$  was found between contingency factors and CMA practices. Which supports the argument that contingency approach that determines the success of accounting systems within organizational and environmental contexts. MPACSs with capable management, digital capabilities, and competitive innovation have higher adoption of CMA tools. It shows that the contextual alignment determines the functionality and sophistication of management accounting systems [23]. The relationships between CMA practices support Freeman's (1984) stakeholder theory [22]. Effective information systems increase accountability to all cooperative stakeholders.

Integrating CMA into cooperative management structures fundamentally improves decision-making. Such decision is mainly timely, data-driven and budget supportive. By analyzing variances and periodic reporting, cooperative boards are able to make effective decisions. There is positive correlation among the frequency of CMA reporting, surplus margin and transparency. It means that systematic reporting

enhances not only efficiency but also trust between members. This dual effect supports the Balanced Scorecard perspective of Kaplan and Norton (1996). It integrates financial and non-financial performance indicators to achieve sustainable organizational success [23].

According to NABARD's 2023 Cooperative Development Report, nearly half of India's PACS and MPPACS lack standardized cost classification and real-time reporting. In contrast, those who adopted digital systems and regular internal audits reduced cost by 38% and scored significantly on transparency. These findings demonstrate that digitized CMA systems are not merely administrative reforms, but significant governance innovations.

These outcomes are also aligned with the reforms proposed by NABARD such as '*Especially the PACS Institutional Strengthening Program*' and the '*PACS Computerization Project*' introduced in 2022. NABARD focuses on financial discipline and control, internal controls, and technology-based transparency. The CMA framework directly reflects these principles. By adopting CMA tools such as cost budgeting, variance analysis, and internal performance audits. MPPACS can easily align their financial functions with NABARD's vision of transforming cooperatives into efficient and self-reliant rural financial institutions.

Both the cooperative and rural credit systems have policy implications of the research. First, regulatory bodies such as NABARD and the Ministry of Cooperation should integrate CMA-based performance standards into cooperative audit and reporting guidelines. This will create standardized efficiency, cost management, and quality of governance in all the states. Second, it is recommended to focus on the capacity building of CMA tools, digital accounting, and data analytics in trainings of the National Cooperative Development Corporation (NCDC) and state cooperative unions. Third, the subsidized digital infrastructure will be supported by policy to guarantee inclusivity because smaller MPACs will be able to implement CMA systems in bulk. Lastly, integration of the CMA framework into collaborative appraisal and refinancing requirements may increase credit worthiness to attract more institutional funds and investment partnerships.

#### I. CONCLUSION

This paper demonstrates that integrated cost and management accounting (CMA) system greatly promotes the financial practices and transparency as well as sustainability of multipurpose primary agricultural cooperative societies (MPACS) in India. Results have shown that the most significant aspect in effective CMA implementation is the use of technology, appointment of professionals in accounting and the involvement of management. The

combination of costing, budgeting, and variance analysis with internal controls makes the accountability stronger and allows the cooperatives to make data-driven decisions according to the stakeholder and cooperative governance principles.

The offered framework also helps in the cooperative management by closing the divide between the financial control and participatory governance, and making MPPACS more than compliance-driven institutions but performance-driven institutions. It facilitates the cooperative modernization strategy by NABARD by means of normalizing reporting and digital incorporation.

Policymaking-wise, it is possible to enhance efficiency, minimize irregularities, and institutional credibility by introducing CMA practices into the cooperative audit and financing systems. Future studies need to be on digitizing CMA systems, the use of AI in financial analytics, and longitudinal studies to determine the long-term effects of sustainability. On balance, this research paper abides by confirming that, besides being an economic imperative, the incorporation of CMA in cooperative operations is also a strategic direction towards realizing transparent, accountable, and sound rural financial institutions.

#### REFERENCES

- [1] X. Zhu and G. Wang, 'Impact of Agricultural Cooperatives on Farmers' Collective Action: A Study Based on the Socio-Ecological System Framework', *Agriculture*, vol. 14, no. 1, p. 96, Jan. 2024.
- [2] T. W. Gezahegn, S. Van Passel, T. Berhanu, M. D'Haese, and M. Maertens, 'Big is efficient: Evidence from agricultural cooperatives in Ethiopia', *Agricultural Economics*, vol. 50, no. 5, pp. 555–566, Sept. 2019.
- [3] K. P. Pokharel, M. Regmi, A. M. Featherstone, and D. W. Archer, 'Examining the financial performance of agricultural cooperatives in the USA', *AFR*, vol. 79, no. 2, pp. 271–282, Apr. 2019.
- [4] D. M. K. Kadaba, P. Aithal, and S. KRS, 'Impact of aatmanirbharta (self-reliance) agriculture and sustainable farming for the 21st century to achieve sustainable growth', Mahesh, KM, Aithal, PS & Sharma, KRS (2023). *Impact of Aatmanirbharta (Self-reliance) Agriculture and Sustainable Farming for the 21st Century to Achieve Sustainable Growth. International Journal of Applied Engineering and Management Letters (IJAEML)*, vol. 7, no. 2, pp. 175–190, 2023.
- [5] D. K. Bekena, 'The Contributions of Primary Multipurpose Agricultural Cooperatives in Socio Economic Development and its Prospect Challenges in West Showa Zone, Oromia Regional State', *International Journal of Advanced Multidisciplinary Research and Studies*, vol. 3, no. 6, pp. 932–948, 2023.

- [6] G. Girma, 'An Assessment of Factors Affecting Good Governance Practice in Cooperatives: The Case of Multi-Purpose Cooperative Society of Toke Kutaye District', 2022.
- [7] K. Tripathy, M. Paliwal, and N. Nistala, 'Good governance practices and competitiveness in cooperatives: An analytical study of Kerala Primary Agricultural Credit Societies', *International Journal of Global Business and Competitiveness*, vol. 16, no. 2, pp. 153–161, 2021.
- [8] B. Pandey, P. Pandey, A. Kulmuratova, and L. Rzayeva, 'Efficient usage of web forensics, disk forensics and email forensics in successful investigation of cybercrime', *Int. j. inf. tecnol.*, vol. 16, no. 6, pp. 3815–3824, Aug. 2024.
- [9] C. R. Rodriguez, D. Angeles, R. Chafloque, F. Kaseng, and B. Pandey, 'Deep learning audio spectrograms processing to the early COVID-19 detection', presented at the 2020 12th International Conference on Computational Intelligence and Communication Networks (CICN), IEEE, 2020, pp. 429–434.
- [10] Chiranjeevee Khadka, Ghanshyam Pandey, Arbin Poudel, and Eva Cudnilova, 'Assessing Financial Management Practices and Accounting Mechanisms in Agricultural Cooperatives: A Case Study from Nepal', *MS*, vol. 12, no. 3, June 2024, doi: 10.17265/2328-2185/2024.03.002.
- [11] Gregori. R. Kontsevov, D. N. Ermakov, N. I. Rylova, V. P. Leoshko, and M. F. Safonova, 'Management accounting of agricultural production: improving planning and standardization of costs in the management information system', *AI*, vol. 9, no. 27, pp. 284–293, Mar. 2020.
- [12] M. Minzar and M. K. Mishra, 'THE ROLE OF MULTI-PURPOSE COOPERATIVE SOCIETIES IN THE AGRICULTURAL SUPPLY CHAIN IN INDIA', *Phoenix: International Multidisciplinary Research Journal (Peer reviewed High Impact Journal)*, no. 1, p. 109, 2025.
- [13] M. Chaure, 'Viability Analysis of Primary Agricultural Cooperative Society: A Case in Pune, India', in *Cooperatives as a Catalyst for Sustainability: Lessons Learned from Asian Models*, World Scientific, 2023, pp. 287–297.
- [14] L. Maniego, 'The Balanced Scorecard Approach to measuring Cooperative Performance: Implications for Multipurpose Cooperatives in the Philippines', *Div Journ*, vol. 9, no. 1\_Special, Apr. 2024.
- [15] V. Kumar, K. Wankhede, and H. Gena, 'Role of cooperatives in improving livelihood of farmers on sustainable basis', *American journal of educational research*, vol. 3, no. 10, pp. 1258–1266, 2015.
- [16] M. Raman, 'Technical, Pure Technical and Scale Efficiency of Primary Agriculture Cooperative Credit Societies in Tamil Nadu', presented at the International Conference on Data Envelopment Analysis, Springer, 2024, pp. 223–250.
- [17] A. K. Sahoo, S. K. Meher, T. C. Panda, S. Sahu, R. Begum, and N. Barik, 'Critical review on cooperative societies in agricultural development in India', *Current Journal of Applied science and technology*, vol. 39, no. 22, pp. 114–121, 2020.
- [18] D. V. Kondratyev, G. Y. Ostaev, A. K. Osipov, T. P. Bogomolova, E. V. Nekrasova, and O. V. Abasheva, 'Organizational and management mechanism for reforming agricultural organizations based on cooperation and integration of economic systems', *Amazonia Investiga*, vol. 9, no. 25, pp. 376–388, 2020.
- [19] Vijaya C, 'Cooperatives in India: A Comprehensive Analysis for Sustainable Development', 2025, *SSRN*.
- [20] O. T. Nhung, L. T. Lan, and H. Le Thi Thu, 'Explore the Role of Management Accounting in Decision Making in Vietnamese Agricultural Cooperatives', *ejeba*, vol. 1, no. 2, pp. 63–71, May 2024.
- [21] D. K. Panda, K. Bhattacharjee, D. Chatterjee, and S. Basu, 'Survival and sustenance strategy of primary agricultural cooperative credit societies in India: a fuzzy interpretive structural modelling approach', *IJSE*, vol. 50, no. 6, pp. 821–838, May 2023.
- [22] R. E. Freeman, *Strategic management: A stakeholder approach*. Cambridge university press, 2010.
- [23] R. H. Chenhall, 'Management control systems design within its organizational context: findings from contingency-based research and directions for the future', *Accounting, organizations and society*, vol. 28, no. 2–3, pp. 127–168, 2003.
- [24] J. Burns and J. Vaivio, 'Management accounting change', *Available at SSRN 289124*, 2001.
- [25] R. Cooper and R. S. Kaplan, 'Profit priorities from activity-based costing', *Harvard business review*, vol. 69, no. 3, pp. 130–135, 1991.
- [26] C. Drury, *Cost and management accounting*. Cengage Learning Andover, Hampshire, 2018.
- [27] K. Langfield-Smith, 'Strategic management accounting: how far have we come in 25 years?', *Accounting, Auditing & Accountability Journal*, vol. 21, no. 2, pp. 204–228, 2008.
- [28] J. Birchall and L. H. Ketilson, *Resilience of the cooperative business model in times of crisis*. International Labour Organisation, 2009.
- [29] R. M. Bushman and A. J. Smith, 'Transparency, financial accounting information, and corporate governance', *Financial accounting information, and corporate governance. Economic Policy Review*, vol. 9, no. 1, 2003.
- [30] K. M. Eisenhardt, 'Agency theory: An assessment and review', *Academy of management review*, vol. 14, no. 1, pp. 57–74, 1989.
- [31] R. S. Kaplan, 'The balanced scorecard: translating strategy into action', *Harvard Business Review Press*, 1996.
- [32] C. Cornforth, 'The governance of cooperatives and mutual associations: A paradox perspective', *Annals of public and cooperative economics*, vol. 75, no. 1, pp. 11–32, 2004.
- [33] S. Kalogiannidis, S. Karafolas, and F. Chatzitheodoridis, 'The Key Role of Cooperatives in Sustainable Agriculture and Agrifood Security: Evidence from Greece', *Sustainability*, vol. 16, no. 16, p. 7202, Aug. 2024.