Prototype of KPI Profitability Module Integrated into Accounting Information System at Smart UNIKOM Cooperative

Dony Waluya Firdaus* and Wulan Keisha Permata

Department of Computerized Accounting, Universitas Komputer Indonesia, Bandung, Indonesia
*dony.waluya.firdaus@email.unikom.ac.id

Abstract. The purpose of this research is to develop a prototype of the Key Performance Indicators (KPI) Profitability Module that can be integrated with the current Accounting Information System (AIS) at the Smart UNIKOM Cooperative. The method used is a prototype, researchers have just carried out the first and second phases in the prototype process, Phase 1: Identification of User Needs and Phase 2: Initial Prototype Design using AppSheet: We are still developing and refining the module iteratively based on collaborative data collection and user feedback. Testing of the profitability model (ROA, ROE, and NPM) prototype stage. In the future, the research will develop and conduct Phase 3, namely Testing and Feedback: Trialing the prototype with users to receive feedback, which will be used for design iteration and module refinement. Using the KPI module can be done in real-time and normalized; this system improves managerial decision making, transparency, and accountability of cooperatives. This application is an important step in advancing cooperative governance through digital technology and offers a replicable model for other, similar organizations to improve financial performance monitoring.

Keywords: Prototype, KPI, Profitability, Accounting Information System, Cooperative.

1 First Section

Cooperatives must possess reliable Key Performance Indicators (KPIs) to aid managerial decision-making. However, manual intervention in KPI calculation and monitoring, particularly profitability ratios such as Net Profit Margin (NPM), Return on Assets (ROA), and Return on Equity (ROE), generally lead to late reporting, data inconsistencies, and potential reporting bias. It has been demonstrated that the digital maturity of a cooperative is highly correlated with the organization's ability to utilize integrated data for real-time performance monitoring [1]. It has similarly been explained that the quality of AIS systems and information directly influences organizational benefits, including the quality of financial reports used as the basis for KPIs [2]. At the local level, it has been demonstrated that the application of digital technology, AIS, and internal

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control systems significantly improves the financial performance of cooperatives [3]. It has meanwhile been emphasized that the application of financial information systems is important for improving the effectiveness of AIS in cooperatives [4]. Hence, there is a dire necessity to design a prototype of a profitability KPI module integrated into the cooperative AIS, for example, in Smart UNIKOM Cooperative, such that data validation, ratio calculation, and drill-down towards transaction journals can be performed automatically with less manual error and an accelerated decision-making process.

An integrated and automated Accounting Information System (AIS) can rectify the disadvantages of profitability KPI measurement by bringing together transaction streams of data, closing rules of accounts, and formulae of measurement (ROA/ROE/NPM) into an automated chain process, where financial reports are not only output but also continuous input for real-time and auditable calculation of KPIs [5]. Empirical research has proven that AIS quality (system quality, information quality, internal control) directly contributes to the validity of non-financial data and the success of managerial decision-making; integration and automation enable more pertinent, timely, and actionable KPIs [5]. Integration of dashboards and business-intelligence tools in combination with the profitability module increases managerial perceptions and facilitates prototype design iteration through usability testing of formulas and recording flows [6]. Regarding MSMEs/cooperatives, findings from Indonesia reveal that the adoption of integrated accounting application increases the effectiveness of record-keeping, reduces errors made by hand, and improves the database for calculating profitability KPIs [7]. Therefore, a prototype profitability KPI module as one of the AIS components (with the principle of fit-for-use: proper accounting, auditable, and easy maintenance) indeed satisfies managerial control requirements and collaborative KPI monitoring needs.

AIS literature indicates that system quality, information quality, and process suitability within an AIS are closely linked to managerial control and organizational performance. When the architecture and data flow are well-designed, organizations obtain relevant, timely, and actionable information to monitor key indicators [5]. Financial reports integrated with the profitability module can improve cooperative KPIs. Reports serve not only as output but also as input into the profitability KPI process. From a software engineering perspective, prototype development provides space for design science experiments to validate user needs and the suitability of accounting processes. A stepwise approach, from account data modeling and closing rules to deriving ROA/ROE/NPM formulas, allows for rapid iteration and direct usability testing with cooperative users. The fit-for-use principle, derived from AIS literature, requires prototypes to be not only accounting-correct but also efficient, auditable, and easy to maintain [5]. Although the benefits of KPI modules to determine the social and economic performance of cooperatives have been widely discussed, the most recent work identifies a significant gap: a majority of cooperatives lack a profitability KPI module fully integrated within their AIS, and KPI designs tailored to the cooperative sector are limited. For example, in a West Java coffee cooperative, IT-based business models and information technology are found to improve the performance and sustainability of cooperatives, but an implementation of a profitability KPI module that combines financial indicators and member benefits in an integrated system has not been investigated [8].

In other studies, on agricultural cooperatives, the uptake of digital innovations such as management apps and IoT has increased member productivity and satisfaction, but instances of KPIs with combined profitability and non-financial dimensions in the AIS are limited [9]. Moreover, research in the municipal government (Klaten) confirms that AIS performance is positively correlated with organizational reporting accountability, affirming the need for a KPI module in the cooperative's financial and operational information system to facilitate more transparent and effective reporting and decision-making [10]. Therefore, the prototype of profitability KPI module in Smart UNIKOM Cooperative should combine traditional profitability measures (ROA, ROE, NPM) with member benefit indicators such as SHU distribution, member satisfaction, and social contribution into a single coherent AIS interface so managerial decision making is more precise and meaningful.

Therefore, this study aims to prototype a KPI Profitability Module Integrated into The Accounting Information System at Smart UNIKOM Cooperative using a prototyping methodology. Several recent Indonesian researches have shown that attributes of accounting information systems, i.e., broad scope, timeliness, integration, and data aggregation, have positive relationships with MSMEs' financial performance. For example, it has been confirmed that AIS with broad scope and timeliness significantly supports the enhancement of MSMEs' financial performance [11]. Moreover, other research suggests that the utilization of accounting information systems and information technology may improve financial report quality despite human resource unreadiness and system integration complexity [12]. These pieces of research support the requirement of governance mechanisms such as formula change control, metric definition documentation, and unique metric ownership in ensuring a sustainable and credible profitability KPI module.

2 Literature Review

2.1 The Role of Profitability KPIs (ROA, ROE, NPM) in Cooperatives

From the performance management perspective, precise KPI measurements must have clear definitions, uniform rules of calculation, and traceability of source data. Profitability KPIs such as ROA (Return on Assets), ROE (Return on Equity), and NPM (Net Profit Margin) must be developed in a manner that they define average asset or equity denominations against ratios at the end of the period, and be directly linked to the accounting accounts in the Accounting Information System (AIS) in order to avoid manual reconciliation and input discrepancies. In terms of cooperation, profitability performance is below regulatory levels as some empirical evidence indicates. For example, between 2020 and 2022, a study of Al Hudori Cooperative showed that ROA and NPM were below minimum national standards for cooperatives (Amalia, 2023). Similarly, research carried out at KUD Sawit Mandiri from 2018 to 2022 captured an average ROA of 8.64%, which fell below the cooperative threshold of 10%, while ROE was relatively higher but, in certain years, still considered to be poor [14].

The relevance of profitability KPIs to performance risk is also significant: low NPM or ROA can be a sign of inefficient margins and assets, draining cushions against cost

or revenue variations. Based on the study, KPIs such as ROA and NPM are not just reports of performance but early warning devices for cooperative financial risks. Therefore, the profitability KPI prototype module integrated in AIS at Smart UNIKOM Cooperative needs to ensure standardized definitions of KPIs traceable back to accounting information, an automated linking mechanism, and sensitivity analysis functionality for support of proactive decision-making.

2.2 Integration of KPIs into Accounting Information System (AIS)

Existing AIS research confirms that system quality (integration, accuracy, timeliness) directly impacts managerial control and decision-making efficiency. Modern AIS connected with management control and analytics enhances decision usefulness and the potential for performance monitoring [5].

For collaborative management, the use of a profitability integrated KPI module in an Accounting Information System (AIS) enables real-time and standardized financial performance reporting from a single database, thereby preventing misalignment between financial reports and performance measures. Indonesian research suggests that AIS system quality, system competence and information quality, is directly related to system effectiveness and therefore overall organizational performance. For example, it has been indicated that system capability and information quality have a direct positive impact on AIS effectiveness and organizational performance in manufacturing and service firms [15]. Furthermore, an effectiveness study of AIS in savings and loan cooperatives (KSP) in Bangli Regency confirmed that information development formality, information quality, system use satisfaction, and employee knowledge positively influence AIS effectiveness, which in turn improves accountability and quality decision-making [16]. Therefore, in building a profitability KPI module at the transactional level, there is a requirement for entity-relationship mapping and chart of accounts harmonization so that each transaction journal could be mapped to the profitability dimension (e.g., product, business unit, member) from the start, a data-first approach that enables proper and responsible aggregation of profitability KPIs

2.3 Prototyping Methodology in Information System Development

In recent studies, prototyping information system development approaches, for example, KPI modules implemented in accounting systems, call for an iterative, artifact-based, and user-validated design science research (DSR) process. For example, a prototype design management dashboard was created using DSR, which was iteratively developed with design managers as key stakeholders to incorporate reporting and coordination modules derived from the real needs of the company [17]. These pieces of work imply the need for user artifact verification during the iterative life cycle to ensure the usability and validity of the generated metrics. Furthermore, a process model for digital innovation was introduced that integrates DSR methodology and innovation strategy, incorporating collaborative design decisions on artifacts (including KPI specifications) by stakeholders and testing through early prototypes [18]. On the contrary, a COVID-19 pandemic study of KPIs in manufacturing industries highlighted the necessity of dynamically updated indicators that are empirically tested through surveys

and Pareto analysis to ensure they remain relevant, measurable, and prioritized according to actual operating conditions [19]. These three studies corroborate the prototyping method to KPI modules, i.e., user requirements analysis followed by prototyping, user validation/metrics, and design iterations with regard to organizational and technological factors, so that the KPI module is fit-for-use and properly integrated into the accounting system.

3 Method

In this study, a prototyping approach was employed to design a Profitability KPI Module that is integrated into the Accounting Information System at UNIKOM Cerdas Cooperative. This is also in accordance with best practices in the extant literature [20], [21]. Data analysis strategies are steps in the research process that use obtained data to answer questions that are already there. The analysis approach for creating a student attendance information system is derived from the prototype system development methodology [22] (see Fig. 1).

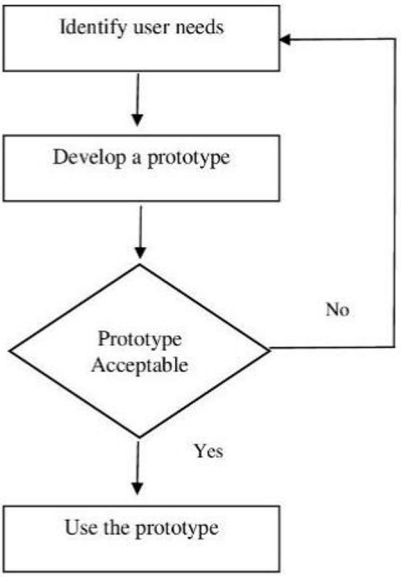

Fig. 1. Key Stages in Prototype Development and Research Process.

There are several phases in the prototyping process, and in this study, the researchers conducted Phase 1: Identification of Users' Needs and Phase 2: Designing the Initial Prototype using appsheet:

Phase 1. Identification of User Needs: User needs were determined through surveys and interviews with the staff of cooperatives so that the module developed will be compatible with their operational requirements.

Phase 2. Initial Prototype Design: A appsheet interactive prototype of the KPI module was designed, allowing stakeholders to walk through the functionality and interface before further system development.

Phase 3. Testing and Feedback: Pilot test the prototype with users to receive feedback, which will be used for design iteration and module refinement.

This approach corroborates previous findings emphasizing prototyping as a means to explore problem spaces and solutions within the context of hackathons [20]. Moreover, it has been demonstrated that user testing of web-based prototypes can provide valuable feedback for further system development [21]. Thus, the prototyping approach applied in this study is likely to produce more concrete and effective solutions.

4 Results and Discussion

4.1 Results

The first development result of KPI Profitability Module Prototype integrated into the AIS on Smart UNIKOM Cooperative is a splash screen (see Fig. 2). This initial screen shows the app's name and logo – reflecting the desire to look both professional (like a proper system) and modern (and therefore flexible). In terms of usability, the splash screen acts as a visual feature, but also as a brief delay for the system to load some benign code prior to allowing access to the main menu. The user is a crucial aspect in determining the first impression of the system, using an information system design that incorporates the Profitability KPI Module.

AppSheet, which is built on Android, has some limits when it comes to customizing complicated designs and functions. However, survey results show that it makes system development quick and straightforward, and it is widely considered as an expert application platform for functionality [22].

Users land on the main menu shown in Fig. 3, from where they can directly launch the financial and profitability reports modules. Designed for cooperative administrators with limited technical training, the layout is deliberately kept clean, visual, and self-explanatory. This choice echoes findings that underline the importance of simple interfaces for the uptake of accounting information systems in small and medium enterprises.

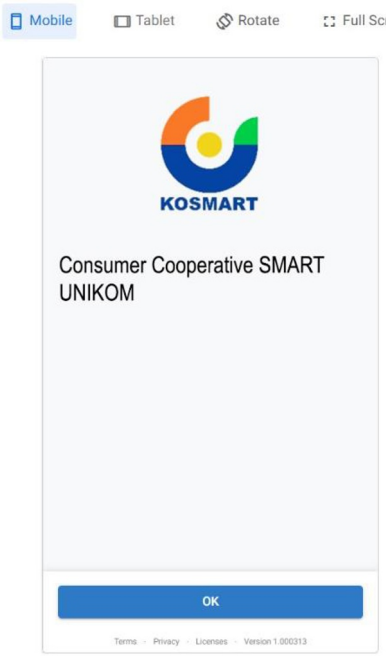

Fig. 2. Splash Screen.

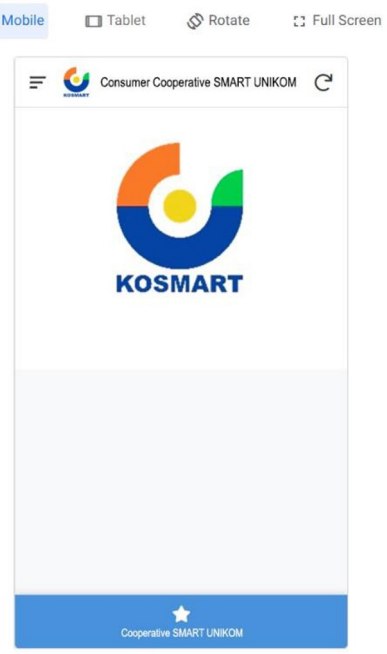

Fig. 3. Navigation Center.

Beyond serving as a gateway, the main menu channels raw accounting entries into actionable profitability key performance indicators, thereby transforming data into relevant financial insights. The financial reporting module, illustrated in Fig. 4, is the core engine for calculating key profitability ratios, ROA, ROE, and NPM. By automatically pulling data from existing financial statements, the module minimizes the risk of manual data entry errors. This automation advantage is corroborated by studies that document expedited decision cycles and higher data reliability as notable outcomes of accounting system automation. Thus, financial reports serve as a data source that can be directly used for KPI processing without the need for time-consuming manual reconciliation.

Fig. 5 confirms that financial reports entered into the system can be directly and automatically processed as input data in the profitability module. This process demonstrates how the prototype successfully connects the traditional accounting cycle with KPI-based managerial analysis. In the context of cooperatives, this integration is crucial because most cooperatives face limited human resources to manage financial data quickly and accurately. With this automation system, cooperatives can evaluate their financial performance in real time, without having to wait for end of period reports.

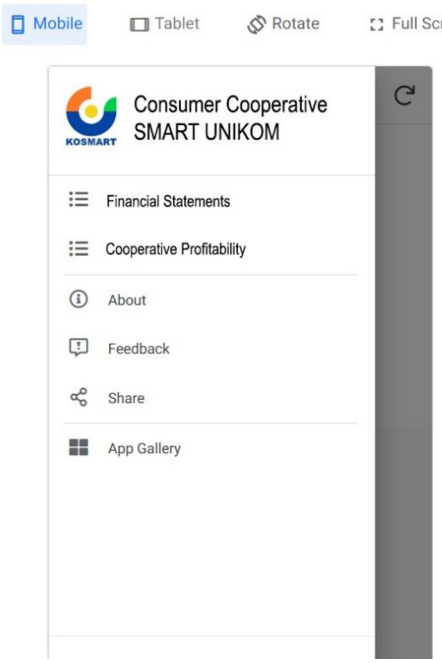

Fig. 4. Menu Financial Report and Profitability Report.

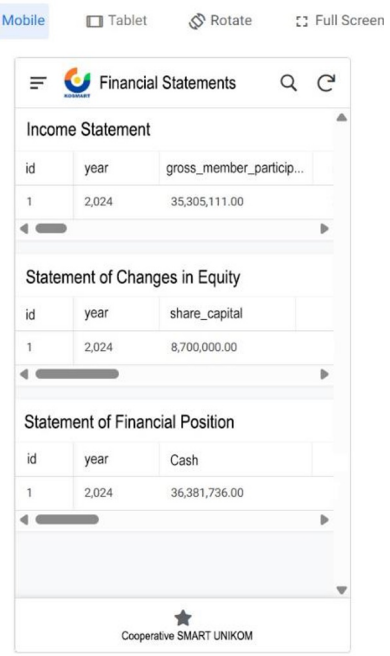

Fig. 5. Automatically Processed.

The core of the prototype is shown in the profitability report (see Fig. 6). This module automatically displays the results of Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM) calculations based on integrated financial report data. The visualizations presented are tables and percentages, designed to be simple and easy to understand for cooperative administrators.

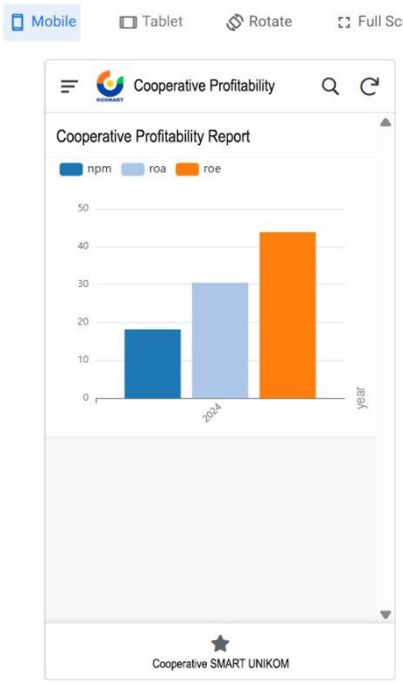

Fig. 6. Key Stages in Prototype Development and Research Process.

These outcomes show that the system effectively converts unprocessed accounting data into managerially useful information. Incorporating member feedback at each prototyping sprint helps fine-tune interface elements and underlying algorithms, thereby enhancing practical alignment and user adoption during the full rollout. Beyond user engagement, the compression of the software development lifecycle into shorter cycles produces faster learning loops and enables progressive refinement of key algorithms, particularly those that generate profitability ratios. As unnecessary features are systematically weeded out and computational bottlenecks are identified and resolved, the final system emerges tighter and computationally more efficient, reducing operational cost and enhancing system responsiveness at scale.

Escalating strategic alignment, every profitability KPI generated, be it member return, asset effectiveness, or overall cooperative agility, becomes contextualized within the cooperative's specific mission and operational horizon. The underlying data model can, therefore, be iteratively re-engineered at moderate cost, reflecting evolving member priorities, changing regulatory frameworks, or shifts in cooperative competitive environments. By embedding re-engineerable data semantics directly into the prototype ensuring minimal locking into excessive custom elasticity, the system inherently absorbs environmental change and preserves user confidence in profitability insights.

4.2 Discussion

The profitability module can be integrated with ROA, ROE, and NPM to automatically generate KPIs. Conceptually, the use of these indicators is consistent with the literature that considers ROA/ROE/NPM as core metrics for evaluating asset utilization efficiency, return on equity, and profit margins. Implementation-wise, the module should explicitly document formula definitions, to ensure uniform interpretation. Without such documentation, even if the numbers appear automatically, their meaning could differ between historical manual reports and new reports potentially leading to internal confusion. Cooperative literature suggests that performance metrics should consider the social/member dimension, not just financial measures.

In the context of SMART UNIKOM, the current prototype, which focuses on profitability KPIs, provides a strong foundation for economic measurement; however, to achieve full relevance for cooperatives, the module needs further development to generate metrics that link profit to member benefits (e.g., patronage refunds, surplus per member) and business unit segmentation. This requires adding dimensions to the data model (member ID, business unit, product) so that KPIs can be drilled down to the tactical decision level.

From a managerial perspective, this prototype provides a tool to accelerate decision-making: administrators can monitor ROA/ROE/NPM movements over a shorter timeframe, identify the causes of declining margins, and design operational interventions. At the cooperative's internal policy level, these results can encourage the establishment of routine KPI reporting, integration of KPIs into board/member meetings, and increased accountability. However, to be effective, administrators need to establish realistic KPI targets and a policy for communicating results to members.

5 Conclusion

The Profitability KPI Module prototype integrated into the SMART UNIKOM Cooperative AIS successfully presents ROA, ROE, and NPM calculations automatically and visualizes them in an easy-to-read format (see Fig. 5 and Fig. 6). This integration reduces the need for manual reconciliation and improves source data traceability. This adds value for management. The automated presentation of KPIs enhances management's ability to monitor profitability and make operational decisions more quickly, reflecting the principle of decision-usefulness in a modern AIS. For KPI figures to be meaningful and accountable, documentation of KPI definitions, calculation standards, and data governance mechanisms, including those responsible for metrics and validation procedures, must be developed. The current prototype focuses on core profitability KPIs and does not yet incorporate liquidity, solvency, or non-financial metrics that are important to the cooperative. Furthermore, long-term success depends on the quality of the input data and the organization's readiness to implement process changes. This research provides proof of concept that integrating profitability KPIs into a cooperative's AIS improves the relevance of managerial information. Further research is needed to

examine the impact of the prototype on cooperative decision-making and actual performance during the implementation period (longitudinal study), as well as explore the addition of predictive analytics for profitability projections.

The main limitation of this research is that it presents a prototype that has not been fully implemented and intensively tested in the cooperative's daily operational environment. Researchers have only conducted the first and second phases in the prototyping process, Phase 1 is User Needs Identification and Phase 2 is Initial Prototype Design using AppSheet: We are still developing and refining the module iteratively based on collaborative data collection and user feedback. Testing of the profitability model (ROA, ROE, and NPM) prototype stage. In the future, the research will develop and conduct Phase 3, namely Testing and Feedback: Trialing the prototype with users to receive feedback, which will be used for design iteration and module refinement.

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