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Android-Based Studend Cooperative Application (Case Study of Kopma UMK)

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ABSTRACT

Many cooperatives in Indonesia still rely on manual systems, resulting in slow processes, inefficiency, and data inconsistencies. To address this issue, an Android-based KOPMA application was developed using the Dart programming language and Flutter framework. The system facilitates management of member data, sales transactions, and savings in a more effective way. Implementation at KOPMA Universitas Muria Kudus demonstrated faster services, reduced data errors, and improved work effectiveness, while also contributing to student entrepreneurship through a modern and integrated system.

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1. INTRODUCTION

Cooperatives are legal entities established by individuals or cooperative legal entities, with the separation of the wealth of its members as capital to run a business, which fulfills shared aspirations and needs in the economic, social and cultural fields in accordance with cooperative values and principles [1] (Law Number 17 of 2012 Article 1 paragraph (1), concerning cooperatives) [2] . Which aims to advance the welfare of members in particular and society in general and participate in building a national economic order in order to realize a society that is advanced, just and prosperous based on Pancasila and the 1945

Constitution, Sattar (2017; 33). In the development of technology in Indonesian cooperatives, it can be seen from the existence of information systems and technology to facilitate the process of disseminating information and managing member data. [3] . However, not all cooperatives in Indonesia have utilized the development of information systems and technology, one of which is the Muria Kudus University Student Cooperative.

The cooperatives we know so far still use a manual system where the work process is still carried out by humans. This manual system that is still being used seems slow, ineffective, inefficient, and causes many errors in its processing [4] . For example, when recording savings and loan transactions manually, administrators need to write in books or ledgers, which often leads to data redundancy, loss of records, and difficulties in data retrieval. The manual method also limits transparency, because members cannot directly monitor their transaction history without asking the administrator.

In addition, several cooperatives that have attempted to adopt desktop-based systems also face limitations[5]. Desktop applications generally require installation on specific computers, making access restricted only within the cooperative office only. This causes problems when administrators or members need data outside working hours or in different locations[6]. Furthermore, most desktop systems are not integrated with mobile devices, so they lack flexibility for real-time updates and notifications. In today's context, where cooperative members are increasingly mobile and dependent on smartphones, this limitation reduces the practicality and effectiveness of desktop systems. the existing systems, whether manual or desktop-based, cannot meet the needs of cooperatives for fast, accurate, transparent, and easily accessible services. Cooperatives require a system that allows administrators to manage data more efficiently while also enabling members to access information anytime and anywhere[7]. To bridge this gap, a mobile-based application, particularly on the Android platform, is the most relevant solution because it is widely used, open-source, user-friendly, and compatible with real-time data integration.

This condition contrast with the demands of society where people expect services that are fast, precise, and accurate services. In an era of rapid technological development is increasingly rapid, the author realizes that these problems can be solved with the help of sophisticated technology to achieve the cooperatives needed by the community[8] . Cooperatives play an important role in economic development in Indonesia. Founded on the principles of family and mutual cooperation, cooperatives are one of the pillars of the people's economy [6] . Related to technological developments, a system is needed to facilitate performance in cooperative operational activities, especially by using internet technology.

The Student Cooperative (KOPMA) of Muria Kudus University is a cooperative organization whose main activity is entrepreneurship for its members. The business sector managed by the student cooperative at Muria Kudus University still uses a method that is mostly manual, namely all member data and transactions are only done by hand and stored in books, resulting in various problems including, frequent inconsistencies and

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redundancies of data, as well as the lengthy process of searching and accessing data/information [7] . Technology that is developing quite rapidly and is much loved by the public lately is *Android* . *Android* is a Linux-based operating system designed for touchscreen mobile devices, such as smartphones and tablet computers. Android is open-source, user-friendly, and widely adopted by the public, making it an ideal platform for developing modern cooperative applications[11]. Android was originally developed by Android, Inc., with financial support from Google, which then bought it in 2005 [8] . This operating system is an open source and user-friendly operating system, so it is quite easy to use. The objectives of this research are:

1) Building an Android-based application to simplify management at KOMPA, Muria Kudus University.
2) Implement savings on the system.
3) Implement sales transactions on the system.

With this system, it is hoped that company management can plan production more effectively and efficiently based on historical sales data [9] . In addition, this research is also expected to provide academic contributions in the field of developing web-based information systems that are integrated with statistical methods for sales forecasting and support cooperative digitalization.

2. RESEARCH METHOD

2.1. Stage Study

This research uses a user-needs-based software engineering approach to build a web-based sales prediction information system using the Double Exponential Smoothing method. The system development process refers to the **Software Development Life Cycle (SDLC)** *Waterfall* model which consists of five stages: (1) Needs analysis, (2) System design, (3) Program code implementation, (4) Testing, and (5) Maintenance. [14]

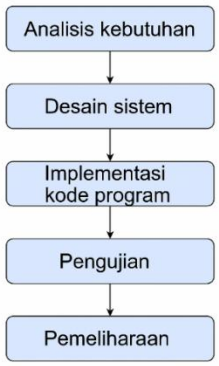

Figure 1. Stage Development Waterfall Model System

Each stage is carried out sequentially, where the output from one stage becomes the input for the next stage. The *Waterfall model* was chosen because the system requirements were determined from the start and the development process was linear and systematic [11]

2.2. Method of collecting data

Data collection methods are divided into two main sources:

2.2.1. Primary Data

Primary data collection was conducted through: a. **Direct observation** at the location of KOPMA Universitas Muria Kudus to understand the business processes and sales systems that are currently running. b. **Interviews** with employees (Mrs. Rini) to obtain in-depth information regarding the distribution flow, transaction recording, and obstacles faced in the savings process of KOPMA members.

2.2.2. Data Secondary

Secondary data is obtained from internal documentation, sales records in Excel format, as well as references to scientific journals and literature related to sales forecasting methods.

2.3. Design System

The system is designed using **the Unified Modeling Language (UML) approach** which consists of several diagrams, including . [16]

1) **Use Case Diagram** : describes the interaction between actors (Admin and Director) with the system.
2) **Class Diagram** : describes the structure of objects and attributes in the system.
3) **Sequence Diagram** : describes the logical flow per transaction.
4) **Activity Diagram** : shows the flow of system activities from login to the prediction process.
5) **Statechart Diagram** : describes the status and changes of the system according to user commands.

The user interface was designed using Dart, while the server side was developed with Flutter, and MySQL was used as the main database for data management. Figures and diagrams are presented with clear labels and descriptions for readability.

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2.4. Testing Method System

System testing is conducted using **black-box testing methods** to ensure each system feature functions as intended. Testing is performed on the following modules:

1) KOPMA Member Savings Transactions
2) Goods Sales Transaction
3) Validation of prediction output (tables and graphs)
4) KOPMA members' savings report
5) If the system provides output that matches the input and calculation formula, it is considered to have successfully passed the functionality test . [17]

The test results using the black-box method show that all the main features run according to specifications. After ensuring the system functionality through black-box testing, a user satisfaction evaluation was conducted to assess the practical acceptance of the system among cooperative members, administrators, and staff.

3. RESULTS AND DISCUSSION

In this section, the results of the implementation of the sales prediction system that has been designed and developed based on the system flow that is running there are explained. The discussion is carried out systematically starting from needs analysis, data processing, prediction calculations, to visualization of prediction results that have been tested functionally [14] . The information system developed has been adapted to the operational needs of KOPMA Universitas Muria Kudus in conducting product sales planning in a more measurable and data-based manner. The design process was carried out by applying the Waterfall model, and all system components were tested using a *black-box testing approach [15]* . To support the validity of the method used, a simulation was carried out of members making savings transactions and purchasing goods. The following presents the results of the system implementation in detail and a discussion based on the calculation process and testing of the KOPMA application at Muria Kudus University [16] .

3.1. Implementasi System

A KOPMA sales and membership application was successfully developed and implemented at the Cooperative at Muria Kudus University. This system has the following key features:

1) Category and product data management
2) Member savings transactions and savings validation
3) The process of selling goods through the system
4) Savings and sales results report

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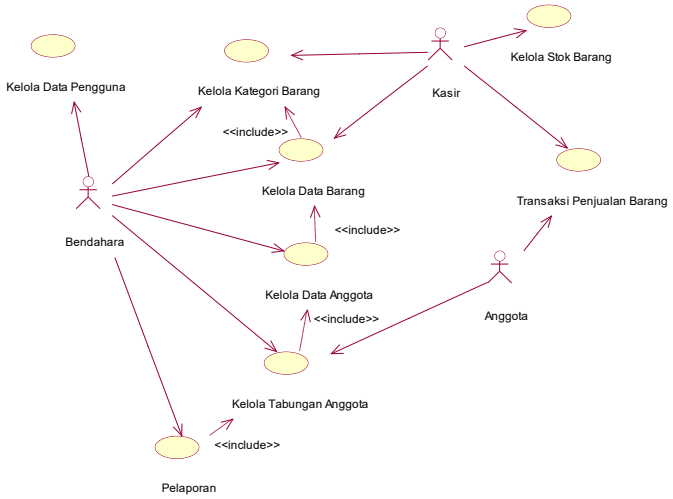

Figure 2. Use Case System

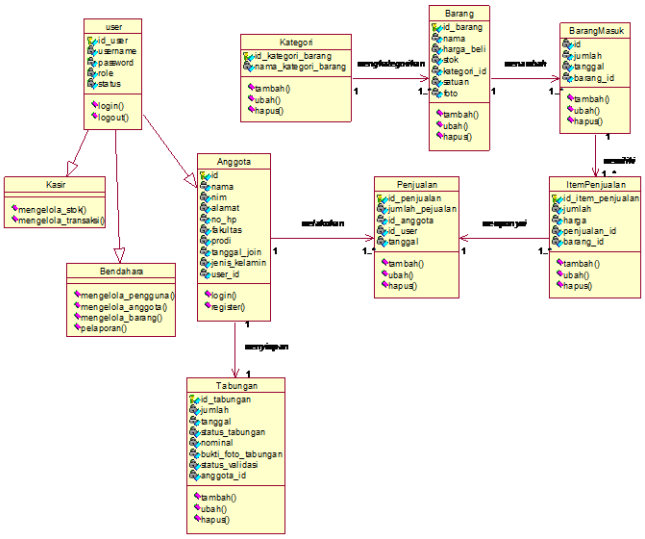

Figure 3. Class Diagram

The system interface is designed to *be responsive* so that it can be accessed from various devices, including computers and smartphones [17] . The system implementation is carried out using the Dart programming language and MySQL database, and is tested using the black-box method to ensure that the functionality runs according to user needs [18] .

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3.2. Testing System

Testing was carried out on several system modules, including:

1) **Data Input and Import Testing** : The system successfully imported data from an Excel file with the standard format provided.
2) **Visual Output Testing** : Report graphs and tables appear automatically according to the forecast results.
3) **Testing Report** : Report files can be downloaded in PDF format by admin or director.

The test results using the black-box method show that all the main features run according to specifications. After ensuring the system functionality through black-box testing, a user satisfaction evaluation was conducted to assess the practical acceptance of the system among cooperative members, administrators, and staff.

3.3 Discussion and Comparison

Compared with previous research [19] which developed cooperative information systems using desktop-based applications, the system in this study has the advantage of portability and flexibility because it is Android-based. Members can access data and perform transactions directly through their smartphones without being limited by place or time. In addition, this system is capable of automatically recording member data, sales transactions, and savings activities, reducing the risk of errors commonly found in manual approaches [20].

To strengthen these claims, a quantitative user satisfaction evaluation was conducted with 20 respondents consisting of student members, administrators, and cooperative staff. The evaluation covered several aspects, including usability, interface design, responsiveness, accuracy, and overall satisfaction. The results are presented in Table 1 and Table 2.

Table 1. User Satisfaction Evaluation Results

Aspect	Mean Score (1–5)	User Feedback
Usability (ease of use)	4.6	Easy to navigate, intuitive for student members, minimal training required.
Interface design	4.1	Functional layout, but some administrators suggested improvements in aesthetics.
System responsiveness	4.3	Fast transaction processing and reporting; occasional delays with larger data.
Accuracy & reliability	4.4	Transactions and savings records were consistently correct and reliable.
Overall satisfaction	4.2	Users generally satisfied; staff noted smooth transition from manual systems.
Average Score	**4.3**	High satisfaction overall, with positive acceptance across all user groups.

Table 1 presents the evaluation of five aspects: usability, interface design, system responsiveness, accuracy & reliability, and overall satisfaction. Each aspect was rated on a Likert scale (1–5) by 20 respondents. The mean score for each aspect was calculated by summing the total score from all respondents and dividing it by the number of participants.

Table 2. User Satisfaction Evaluation Results

Rating	Number of Users	Percentage	User Group Dominant
5 (Strongly satisfied)	10	50%	Mostly student members who valued mobile accessibility.
4 (Satisfied)	7	35%	Mainly administrators highlighting system usefulness.
3 (Moderately satisfied)	3	15%	Supporting staff adapting from manual/Excel systems.
2 (Dissatisfied)	0	0%	–
1 (Strongly dissatisfied)	0	0%	–
Total	20	100%	-

Table 2 shows the distribution of ratings from all 20 respondents. The results demonstrate that **50% (10 users)** gave a rating of 5 (strongly satisfied), **35% (7 users)** gave a rating of 4 (satisfied), and **15% (3 users)** gave a rating of 3 (moderately satisfied). No respondents rated the system as dissatisfied (2) or strongly dissatisfied (1).

The average score was computed based on the weighted sum of all user ratings divided by the total number of respondents. Weighted Mean Formula (User Satisfaction):

$$\text{Average Score} = \frac{\sum(f_i \times x_i)}{N}$$

Where:

f_i = number of respondents for rating category i

x_i = rating value (Likert scale 1–5)

N = total number of respondents

$$\text{Average Score} = \frac{\sum(f_i \times x_i)}{N} = \frac{(10 \times 5)+(7 \times 4)+(3 \times 3)}{20} = \frac{50+28+9}{20} = \frac{87}{20} = 4.3$$

The overall **average score of 4.3/5** indicates that the application achieved a high level of user satisfaction. Overall, the developed application provides a modern solution for student cooperatives in managing business activities, supporting entrepreneurship, and improving service efficiency. This system not only simplifies data management but also accelerates decision-making and enhances member satisfaction. Future improvements may focus on integrating payment gateways and extending scalability to other cooperatives, thus strengthening both academic contributions and practical impact.

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4. CONCLUSION

This study successfully designed and developed an Android-based cooperative application to support the operational activities of the Student Cooperative (KOPMA) at Universitas Muria Kudus. The system integrates core features such as member management, savings validation, product sales, and reporting modules. System validation was conducted using black-box testing, which demonstrated that all modules including data input, transaction processing, reporting, and visualization performed according to the defined requirements without critical errors. These results confirm that the functional aspects of the application meet the expected specifications.

Beyond functional accuracy, the application also showed practical benefits. A quantitative user satisfaction survey involving 20 respondents (student members, administrators, and cooperative staff) evaluated usability, interface design, responsiveness, reliability, and overall satisfaction. The results yielded an average rating of 4.3 out of 5 (85%), indicating a high level of user acceptance and satisfaction. The academic contribution of this study lies in combining the Waterfall development model with mobile-based cooperative systems, offering a methodological reference for similar digital transformation projects. Practically, the application improves transparency, accelerates decision-making, and enhances student participation in cooperative management.

However, the research remains limited to one cooperative case study and has yet to integrate online payment systems or advanced analytics. Future work could explore scalability to broader cooperative networks, the incorporation of payment gateways, and the application of intelligent decision-support tools to further improve predictive accuracy and operational effectiveness.

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