Joko Sutopo_Implementation Apriori Method in Financial Management for Micro, Small, And Medium Enterprises

by Joko Sutopo

Submission date: 06-Mar-2024 11:31AM (UTC+0700)
Submission ID: 2312999634
File name: nancial_Management_for_Micro,_Small,_And_Medium_Enterprises.docx (249.26K)
Word count: 2449
Character count: 13789

Implementation Apriori Method in Financial Management for Micro, Small, And Medium Enterprises

Ade Khoirul Nur Hidayat[1], Joko Sutopo[2]

Student, Department of Informatics, Universitas Teknologi Yogyakarta, Yogyakarta, Indonesia[1]

Lecturer, Department of Informatics, Universitas Teknologi Yogyakarta, Yogyakarta, Indonesia [2]

Abstract: Micro, Small, and Medium Enterprises (MSMEs) are business units in the economic sector owned by individuals or community-based business entities that make significant contributions to Indonesia's economy. MSMEs are businesses directly embedded within communities, often found in residential areas, and play an essential role in daily life. Financial management poses challenges for MSMEs in running their business operations. This research addresses the challenges faced by entrepreneurs in the MSME sector by employing the Apriori method to support the financial management application system. The method involves identifying the highest frequency of interconnected data needed for business operations. The system is developed as an Android-based application using Android Studio software and a database. This application is designed to draw conclusions from financial data, aiding decision-making in financial management for business units.

Keywords: MSMEs, Management Financial, Apriori, Android.

I. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are productive business units in the economic sector owned by individuals or community-based business entities [1]. MSMEs are businesses directly embedded within communities, often found in residential areas, and are essential in daily life [2]. Playing a significant role in Indonesia's economy, MSMEs contribute 60% to the gross domestic product and employ 97% of the workforce, totaling 116.7 million people [3]. Despite their crucial contribution, MSMEs face challenges in optimizing their business units, especially in financial management [4].

Financial management in a business unit requires special attention, given its crucial impact on individuals and organizations, including those in the economic business category [5][6]. Effective financial management involves monitoring financial expenditures, income, and investment values [7][8], posing difficulties for entrepreneurs in organizing and consuming time [9]. To address these challenges, a program application system is needed to assist in managing business finances, specifically in recording expenditures and income [10].

The application system program is developed to provide financial information related to time effectiveness and efficiency in financial management [11][12]. A method is required to aid financial management, and the implementation of the Apriori algorithm is chosen. This method falls under the category of Association Rule Mining (ARM) and is used to identify patterns or relationships among items in a set of data groups [13]. The Financial Management Application System utilizes the Apriori method to present expenditure and income data based on processed data through Apriori, assisting in planned and structured financial decision-making [14].

The research adopts the extreme programming (XP) development method, known for its flexibility in handling changes based on design and features [15]. The objective of this research is to discuss the implementation of the Apriori method in financial management application. This article will elaborate on the Apriori concept, its application in financial management, and application development using the Apriori method. Additionally, the article will address the benefits and challenges of using the Apriori method, along with suggestions for further development.

II. METHODOLOGY

In conducting research, a literature review of previous studies related to the topic of finance management based on application system programs, which have been carried out by researchers, is necessary. This involves collecting the required data from these studies.

Once the necessary data is gathered, the research proceeds to design a program system to address challenges and conducts testing on the program system in line with the research objectives. A method is needed in constructing a program application system, and this research applies the Extreme Programming (XP) method for its development. The following is the step-by-step process of the XP method, as illustrated in Figure 1.

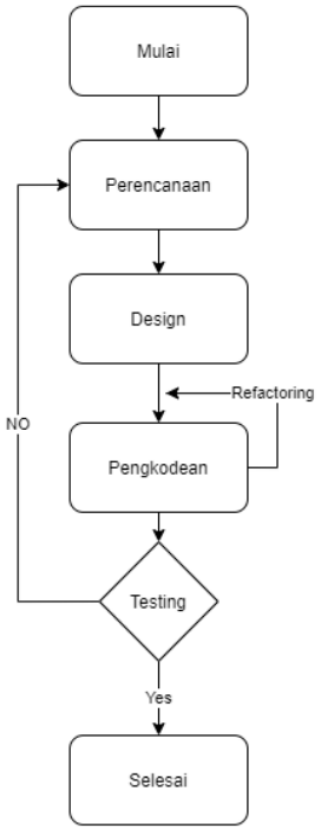

Fig. 1 Extreme Programming

Explanation of the research flow stages in Figure 1 is as follows Planning In the planning stage, the researcher identifies problems or challenges. The identified challenge is that entrepreneurs lack understanding and analysis of the importance of managing finances, which can affect the profit and loss of a business unit.

Design In the second step, the researcher designs a system to address the challenge by defining system requirements, illustrating the flow of system interaction patterns for users, and specifying the necessary features. Coding is a continuation of the design, implemented in the Android programming language, specifically using the Kotlin programming language. Testing In this phase, a series of tests is conducted on the application system program that has been created to identify errors or challenges in the application system.

A. The Stages Of Apriori Method

The Apriori method is a technique for discovering the highest frequency relationships in a dataset, commonly used in transactional data. It involves calculating the frequency of item/item sets and candidate generation to form association rules in data mining, aiming to obtain support values. In this method, if an item set frequently appears, then all subsets of that item set should also appear frequently in the database. This is applied in research to identify financial datasets, determining common occurrences in expenditures, and formulating repayment plans.

The following are the steps in the Apriori method for processing a dataset:

1. Finding Support Values

Support value is a percentage indicating the frequency similarity of a dataset.

$$S_a = \frac{\text{x}}{total\ transaction}$$

2. Confidence value is calculated as the ratio of the joint frequency of two items to the total transactions.

$$C_a = \frac{x + y}{total\ transaction}$$

III. RESULTS AND DISCUSSION

In this section, we discuss the implementation of calculations using the Apriori method and the continuation of development using the Extreme Programming method, which involves achieving the objectives of this research.

A. Result Apriori Methods

This process discusses the calculations of the Apriori method to search for the highest frequency values to be recorded as financial data. The presentation of the data can be observed in Table 1.

Table 1 Data Transaction

Number	Name (a)	Debt (x)	Payment (y)	Total Transaction
1	Firman	3	2	5
2	Elpanda	1	2	3
3	Sam	1	3	4

The next step in the Apriori method involves the process of finding the support value, and here is the calculation.

$$S_a = \frac{\text{x}}{total\ transaction}$$

$$S_{Firman} = \frac{3}{5} = 0{,}6$$

$$S_{Elpanda} = \frac{1}{3} = 0{,}3$$

$$S_{Sam} = \frac{1}{4} = 0{,}2$$

Thus, from the above calculation results, it is concluded that the highest value from the process of searching for support values can be seen in Table 2.

Table 2 Value Support

Number	Name (a)	Value Support
1	Firman	0,6
2	Elpanda	0,3
3	Sam	0,2

After finding the support values, the Apriori method involves a second calculation process, which is to find the confidence values. The following is the calculation for finding confidence values.

$$C_a = \frac{x + y}{total\ transaction}$$

$$C_{Firman} = \frac{3+2}{12} = 0{,}4$$

$$C_{Elpanda} = \frac{1+2}{12} = 0{,}3$$

$$C_{Sam} = \frac{1+3}{12} = 0{,}2$$

From the results of the above calculation process, it can be concluded that the highest values from the confidence value search process can be seen in Table 3.

Table 3 Value Confidience

Number	Name (a)	Value Confidience
1	Firman	0,4
2	Elpanda	0,3
3	Sam	0,2

From the Apriori calculation method above, we obtained information that the highest frequency values are Firman, Elpanda, and Sam. This data can be used as a decision-making tool for managing the financial aspects of the business unit.

B. Results

This section discusses the results of the development of a financial management application system for micro, small, and medium enterprises (MSMEs) using the Extreme Programming (XP) methodology. Below are the stages of the development of the application system.

1. Planning

To build a system, planning is essential to achieve the research objectives. It involves gathering information related to the application system that will be constructed and incorporating it into the system's required features. The results of the collected information needed in the system are as follows application system is intended for use by micro, small, and medium enterprise (MSME) owners, the system is capable of receiving financial data input and storing it in a database, and the system utilizes input data as a recommendation material to assist in managing finances efficiently and succinctly.

2. Design

The design stage of this financial management system uses a use case diagram to illustrate the interaction between the user system design and the running system. Users operate the application system to run their businesses by inputting data and viewing financial recommendations generated by this built system. The system overview can be seen in Figure 2.

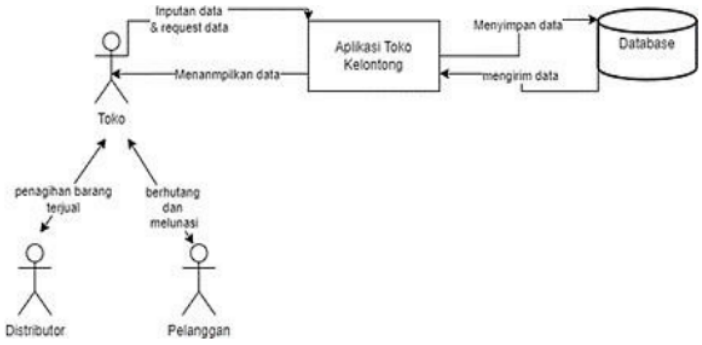

Fig. 2 System Flow

3. Code

The coding phase is the implementation stage of the system design and planning, built using the Kotlin programming language through the Android Studio software. Below is a brief overview of the system that has been implemented in the form of an application, tailored to the needs:

a. Login Page

The login page is the first view accessed by users, serving as a means for users to log into the application. The implementation of the login page can be seen in Figure 3.

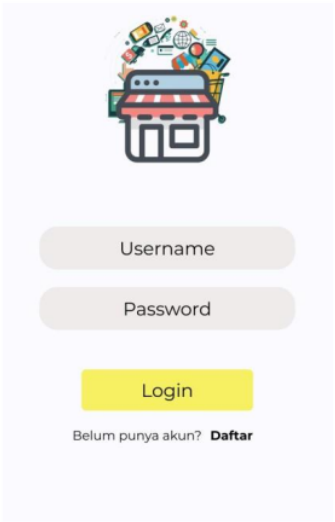

Fig. 3 Login Page

b. Registration Page

The registration page serves as a means for users to register if they do not have an account connected to the application. The implementation of the registration page can be seen in Figure 4.

Fig. 4 Registration Page

c. Menu Page

The main page is the central activity display of the application, presenting processed information data for users. There is data that has undergone the Apriori method process, serving as recommendations for managing finances in the business. The implementation results can be seen in Figure 5.

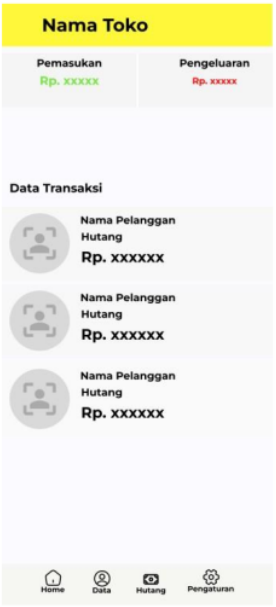

Fig. 5 Menu Page

d. Financial Input Page

The financial input page allows users to input customer or distributor data. The implementation results can be seen in Figure 6.

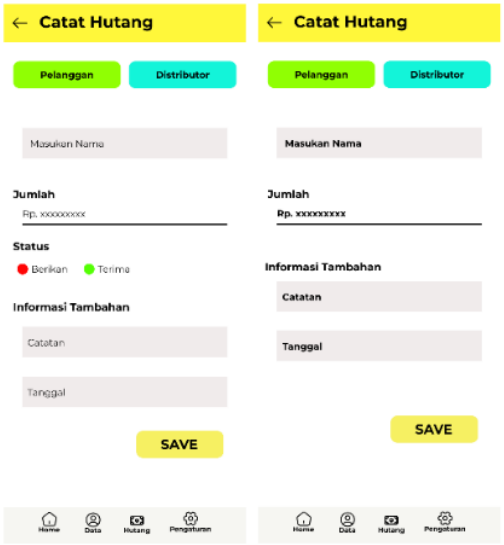

Fig. 6 Financial Input Page

e. Data Page

The data page displays a list of customer and distributor data previously entered. This page also allows users to make changes if needed. The data page can be seen in Figure 7.

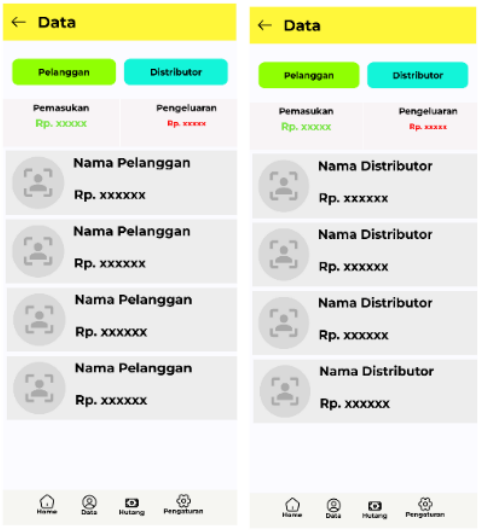

Fig. 7 Data Page

f. Detail Data Page

The detail data page provides a more comprehensive view of customer and distributor data and allows users to make changes if necessary. The implementation of the detail data page can be seen in Figure 8.

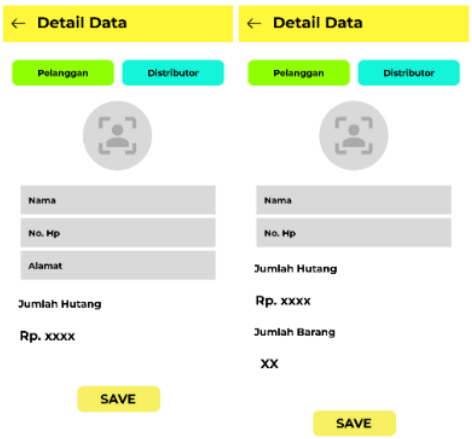

Fig. 8 Detail Data Page

4. Testing

Before the MSME financial management system is utilized, the system undergoes testing using black box testing. Black box testing involves evaluating the system in accordance with the research objectives. Below are the results of the black box testing of the system, as shown in Table 4.

Table 4 Black Box

"No	Feature Name	Expected Result	Status
1	Log in	Successful login, then proceed to the main menu page	Successful
2	Register	Successfully create a new account and get registered. Then proceed to the main menu page	Successful
3	Menu	Display stored data	Successful
4	Financial Input	Successfully input data	Successful
5	Data	Successfully display stored data	Successful
6	Detail Data	Successfully display and edit stored data	Successful"

IV. CONCLUSION

In this research, we have successfully developed an Android-based financial management application system for Micro, Small, and Medium Enterprises (MSMEs). The system was built using the Kotlin programming language and implemented the Apriori method for decision-making calculations in financial management. During the testing phase, the black box testing method was applied, resulting in functional values aligning with the features, ensuring the program's functionality aligns with the intended research development objectives.

For future research development in enhancing the financial management system for Micro, Small, and Medium Enterprises (MSMEs), additional features can be incorporated. Furthermore, improvements in the user interface design for a more dynamic and user-friendly experience can be considered.

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