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DESIGN AND CONSTRUCTION OF COOPERATIVE INFORMATION SYSTEM

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ABSTRACT
Cooperative is a business that conducts administrative transactions. Computerization in the field of administration is important to support the smooth running of all transactions quickly, precisely, and accurately. In order to meet these needs, an integrated system is needed, and is able to follow changes in business processes that occur. Objective: to produce a desktop-based application program that can be used to facilitate cooperative management using the ProtoTyping method. Method: Research and Development research was chosen to find or create new products that have advantages in terms of effectiveness, efficiency, and productivity. The research stages start from formulating the problem, analyzing the results and drawing conclusions. This research was conducted in April 2025. The research location was at Koperasi Mandiri Karangrejo Magetan. The approach used is using the Prototyping model. Data collection techniques include interviews, observations and questionnaires. Analysis tests are developed on aspects of functional suitability, reliability aspects with the help of software called Web Application Load, Stress and Performance Testing (WAPT), and usability aspects. Results: a blueprint is produced which is used as a reference in the development of the cooperative information system at the Mandiri Cooperative. Using the Requirements gathering and analysis, Quick design, build prototype, User evaluation, refining prototype, Implement product and maintain design methods, it produces a structured design as the basis for system implementation. The architecture designed is a cooperative information system integrated with computer network technology. Conclusion: the study has compiled a cooperative information system design at the Mandiri Karangrejo Magetan Cooperative which can be accepted with satisfactory assessment results.

Keywords: cooperative information system; information technology; prototyping

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INTRODUCTION

Cooperatives are businesses that carry out many administrative transactions, so computerization in the field of administration is very important to support the smooth running of all transactions carried out by cooperatives so that they can provide transaction services quickly, precisely, and accurately (A. M. Yusuf et al., 2021) (Ikhwan et al., 2024). In this era of globalization, the development of science and technology is spreading rapidly to all corners of the world to solve existing problems (Mulyani & Haliza, 2021). The use of information technology can help solve problems with speed, accuracy, and accuracy in providing information so that in carrying out our work we will get optimal results.Cooperatives are one of the business entities that must also follow the rules on accounting policies and financial reporting formats in accordance with the latest regulations of the Minister of Cooperatives, namely the Regulation of the Minister of Cooperatives Number 4 of 2024. Of course, in this case, the information system that is built must be adjusted to the policies in the latest regulations of the Minister of Cooperatives so that when there is an inspection from the related parties, it is in accordance with the latest regulations of the Minister of Cooperatives (Peraturan Menteri Koperasi Dan Usaha Kecil Dan Menengah Republik Indonesia Tentang Kebijakan Akuntansi Koperasi, 2024). This must be prepared so that the presentation of financial reports and all accounting policies do not violate the rules.

The role of Information Technology (IT) as part of the Information System (IS) has undergone dramatic changes (Pane & Firdaus, 2024). Nowadays, IT is not only expected as a tool to assist organizational activities but is already part of an organization's strategy to achieve its goals. However, the problem today is how to align business strategy and information technology strategy (Sandfreni & Adikara, 2019) One of the driving factors for the use of information systems in organizations is the increasing need for business functions that are carried out. The impact of all this is that many organizations are competing to implement information systems with their technology by only paying attention to momentary needs and allowing the implementation of overlapping information systems and the existence of several systems that are different from each other (Putra & Abdulah, 2022).

Mandiri Cooperative is a cooperative that was established in 2018 located on Jalan Raya Pelem Village, Karangrejo District, Karangrejo Regency, Magetan Regency, has 60 cooperative members consisting of Civil Servants (PNS) and Government Employees with Work Agreements (P3K). The system that has been implemented by Mandiri Cooperative is based on written records by the management of the Savings and Loans Unit cooperative, namely the Treasurer, which is then processed using the Microsoft Excel application. In this problem, the savings and loan data processing system and the processing of installment data in the cooperative are still ineffective in reporting and calculating it and there are still errors in the calculation input by the operator. In addition, information regarding payment data and cooperative bills received by members can only be known if the member comes directly to the cooperative management. To overcome this problem, savings and loan data processing needs to be developed using information technology. Based on the results of observations and interviews with related parties, namely the Chairperson of the Cooperative and the Treasurer of the Cooperative, currently Mandiri Cooperative has not implemented an integrated and centralized information system because the system has not been automated and is still done manually. The existing Information System in its development has experienced obstacles because the system is not in line with the ongoing business process and is made to meet the needs of each section only. This has an impact on requiring a long time in processing cooperative data, organizational data access cannot be done in real-time and becomes an obstacle for cooperatives in data transparency, all users who have access to the system cannot see all the most up-to-date information at any time needed even though the information is inputted by other users. In order to meet these needs, an integrated system is needed, and is able to follow changes in business processes that occur. The purpose of this study is to produce a desktop-based application program that can be used to facilitate cooperative management using the ProtoTyping method.

METHOD

This research is a Research and Development (R&D) research. This research was conducted in April 2025. The location of the research was carried out at the Mandiri Karangrejo Magetan Cooperative. The approach that will be used in this study is to use the Prototyping model, where the prototyping model is one of the models that is suitable for system development. The data collection techniques used in this study include interviews, observations and distributing questionnaires used to collect data on the assessment of the prototype products produced.The test results from the checklist are then analyzed on the functional suitability aspect, the reliability aspect with the stress testing method which is carried out with the help of software called Web Application Load, Stress and Performance Testing (WAPT). The results of the reliability test using WAPT are the number of successful sessions, failed sessions, successful pages, failed pages, successful hits, failed hits. Analysis of the three usability aspect data. The results of the USE questionnaire are then analyzed with a formula to determine the feasibility of the system developed in the usability aspect. The instruments used have been carried out validity and reliability tests, with valid and reliable

results. After obtaining the results of the calculations carried out, the results are then used as a reference to determine the predicate statement from the usability aspect.

RESULT

Requirements gathering and analysis (Needs Analysis Stage)

The analysis stage was carried out on the results obtained from observations and interviews with the management of the Mandiri Karangrejo Magetan Cooperative. Based on the results of the observations and interviews conducted, a general picture of the system running at the Mandiri Cooperative can be seen. The results of the interviews and observations conducted are as follows:

Table 1.
Results of Interviews and Observations

Interview Results	Analysis	Follow-up
Mandiri Cooperative Management still applies conventional methods. Pengurus Koperasi Mandiri masih menerapkan metode konvensional.	The current system implemented in Mandiri Cooperative still uses a conventional system or manual recording.	- From these conditions, it can be seen that a system is needed to help process data so that all calculations involving formulas can be completed quickly and accurately using a system or application. - The system or application is also able to provide reports quickly, both those related to member savings and those related to member financing, including the preparation of financial reports in the form of balance sheets and SHU reports and cash flow reports. - The system can also be accessed online by all members from anywhere and at any time so that data is more transparent and accountable, which has an impact on the trust of cooperative members.
Transactions of data processing activities or data input, both in the form of member savings and financing, are still recorded in excel files.	Activities carried out include recording cash out which includes administrator honorariums, member coaching expenses, operational expenses, administrative and general expenses, THR still uses a manual system written in a book.	
Human error often occurs from the treasurer in member savings transactions and member financing which causes the service of savings transactions and loan installments to take longer.	Administrative activities for receiving installment payments for member financing require a relatively long time to search for the history of member financing installments. This is considered inefficient in terms of the time required	
The Mandiri cooperative treasurer is good, but sometimes human error also occurs such as forgetting to record financing installments and member savings which results in invalidity in the amount of cash in the report with the actual amount of cash.	Human error such as missing member financing installment documents as supporting data for the history of member financing installments. At the end of the year, financial reports must be prepared in the form of a balance sheet and SHU and cash flow. The SHU report must still be detailed into an SHU report that is allocated to several items. One of them is the member SHU report which must be detailed in detail using a formula and this requires quite a long time to complete the calculation so that this will add time to be able to carry out the RAT or Annual Member Meeting.	
Cooperative cash receipts come from principal savings, mandatory savings and voluntary savings as well as installments from member financing		
Cooperative cash expenditures are used for cooperative operational costs including administrator honorariums, member development costs, operational costs, administrative and general costs, THR and other costs.		
The preparation of financial reports still uses the manual method by summarizing all income and expenditure transactions for one month and takes a relatively long time.		
The calculation of the distribution of SHU still uses the manual method which		

takes quite a long time.

From the previous explanation, it can be concluded that there needs to be a development of the system implemented in the Mandiri Cooperative. The development in question is in the form of an information system that aims to assist the performance of the cooperative in carrying out its operational activities starting from registering new members, creating savings accounts, recording member savings, recording member financing which includes submissions, approval of submissions, creating financing accounts, disbursing financing and financing installments and preparing financial reports in the form of balance sheets, SHU and cash flow. Based on this conclusion, it can be seen several needs that are needed in the Design of the Cooperative Information System at the Mandiri Cooperative Karangrejo Magetan. These needs are classified into two types, namely functional needs and non-functional needs.

Functional Needs Analysis

Functional needs analysis includes an analysis of the functions needed in system development. The minimum functions needed in the Design of the Cooperative Information System at the Mandiri Cooperative Karangrejo Magetan, include the function of managing member data, savings product data, financing product data, account data, account type data, job data, agency data search, scheme data management, savings type data, savings transactions and withdrawals and financing transactions.

Non-functional Needs Analysis

Technical Requirement

Technical requirements that include hardware and software requirements in the Cooperative Information System Design and Construction process at the Mandiri Karangrejo Magetan Cooperative are laptops or desktop PCs that have at least Windows 7 or Windows 10 operating systems, local area networks, internet networks, SQL Server and Mikrotik.

Usability Requirement

Based on the analysis that has been done, users who will use this information system are divided into three, namely admin (officer), user (member), and leader. The position of the admin is higher than the user because the admin is the data processor while the user is only the end user of the Cooperative Information System Design and Construction at the Mandiri Karangrejo Magetan Cooperative that will be developed. Therefore, the admin has the right to broader access rights than the user.

Security Requirement

Based on the analysis of the usability requirement, the users of the Cooperative Information System Design and Construction at the Mandiri Karangrejo Magetan Cooperative consist of admin (officer), user (member), and leader where the admin has broader access rights than the user. To realize this situation, researchers added log in and log out features for officers and members separately, so that the security requirement aspect can be met. This feature clearly limits what functions are allowed for users, and also what functions are allowed for admins.

Quick Design

The stage that describes the creation of a simple design that will provide a brief overview of the system to be created. A new design can be created if the user's requirements are known. After that, the design can be made based on the requirement gathering and analysis in stage 1. The following is a simple design image of the system at Koperasi Mandiri

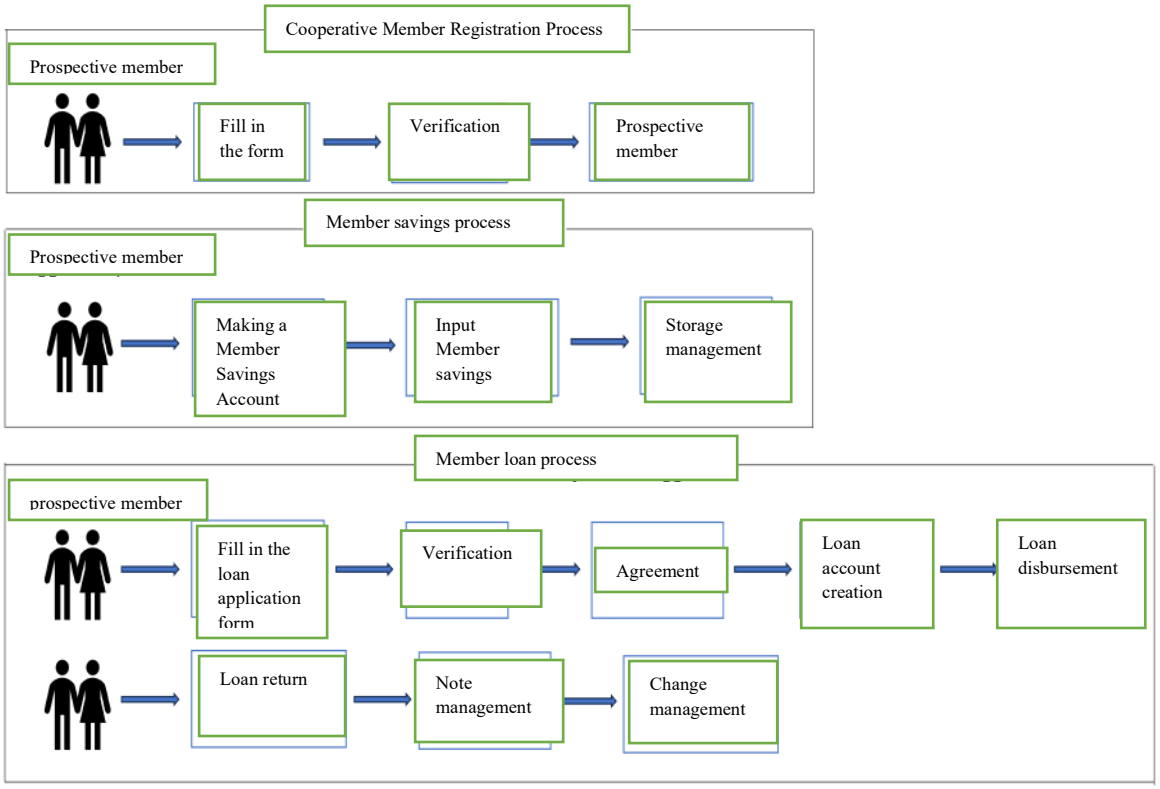

Figure 1 Cooperative Business Process

In Figure 1 above, several input and output designs of the member registration process system, savings process, loan process, and loan repayment process can be described

Build Prototype

The activities carried out at this stage are visualizing the results obtained from the previous stages. The design stage includes architectural design activities, database design, and interface design.

Database Design

This stage functions to design a database. Database design is used to determine the tables that will play a role in the system to be developed. The following is a database structure implemented using SQL Server.

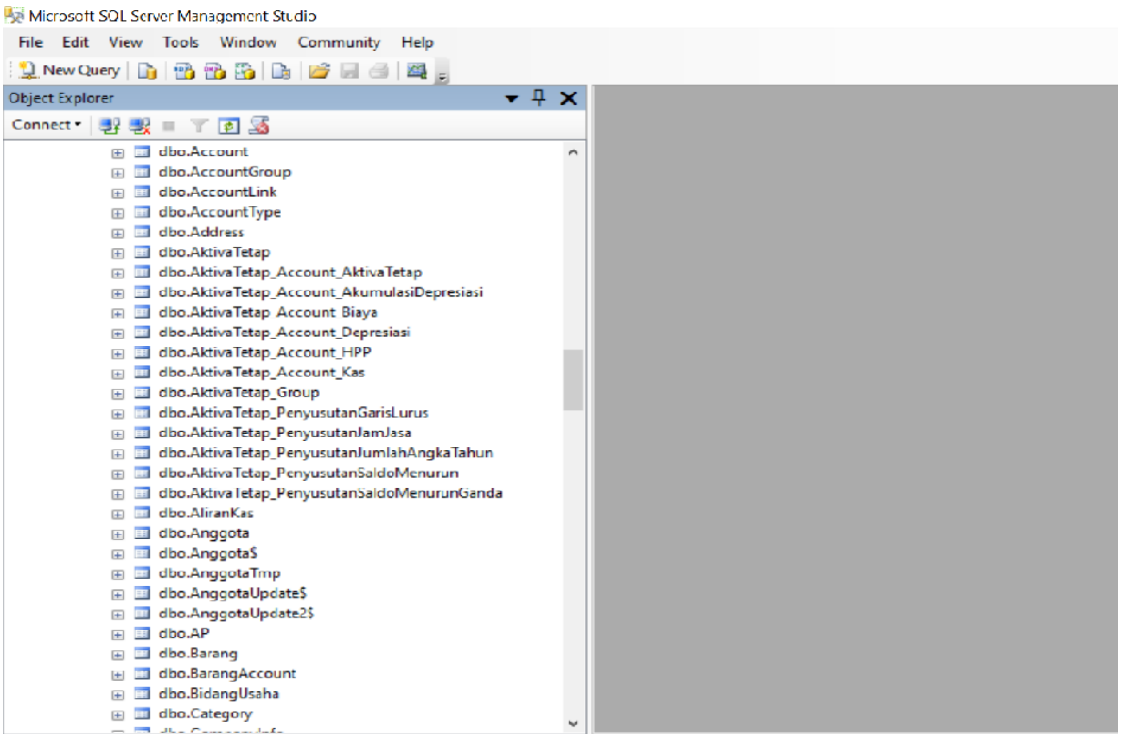

Figure 2 System Database Design

Interface Design

Interface design or user interface is used to describe the design of the interface page display of the system to be developed. The system to be developed by researchers is desktop-based, therefore the interface design will describe the layout or position of each component that plays a role on an application page. The following are the results of the interface design that has been implemented.

Figure 3 Login Page

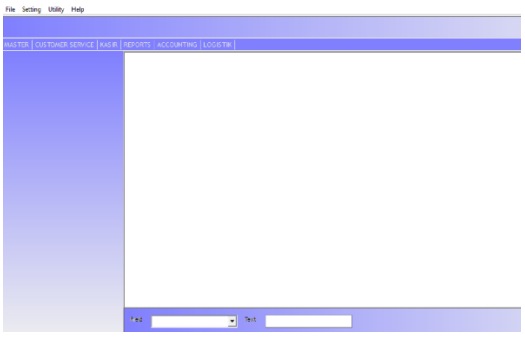

Figure 4 Home Page

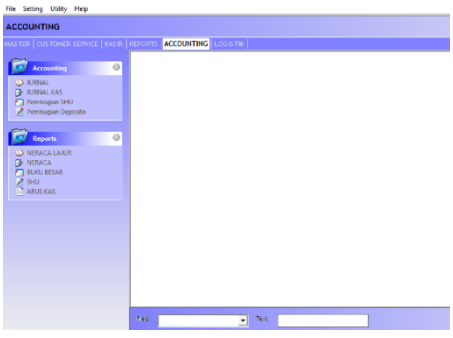

Figure 5 Accounting Page

Figure 6 Cashier Page

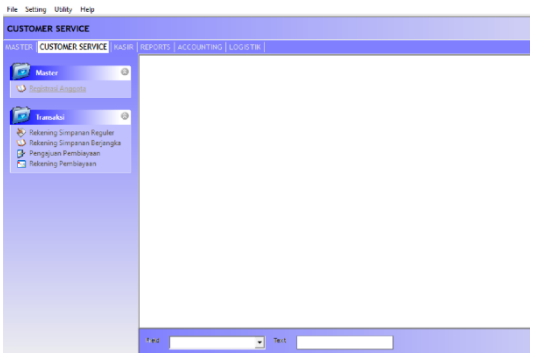

Figure 7 Customer Service Page

Figure 8 Master Page

Figure 9 Report Page

User Evaluation

The functional suitability test was conducted by two expert respondents from various professions. The following is a list of the two expert respondents. The results of the functional suitability test from four expert respondents stated that the login function as admin was running correctly, the change password function was running correctly, the display admin dashboard function was running correctly, the display member list function was running correctly, the add member function was running correctly, the search member function by name was running correctly, the search member function by member status was running correctly, the view member details function was running correctly, the change member data function was running correctly, the delete member data function was running correctly, the display list of Savings Types was running correctly, the add Savings Type function was running correctly, the change Deposit Type data function was running correctly, the delete Deposit Type function was running correctly, the display list of Savings Products was running correctly, the add Savings Product function was running correctly, the change Deposit Product data function was running correctly, the delete Deposit Product function was running correctly, the display user list function was running correctly, the add user function was running correctly, the search user function was running correctly, the view user details function was running correctly, the change user data function was running correctly, the delete user data function was running correctly, the activate user status function was running correctly, the display list of savings was running correctly, the add savings function was running correctly. correct, The function of searching for savings is running correctly, The function of purchasing is running correctly, The function of displaying the list of Loan Applications is running correctly, The function of adding Loan Applications is running correctly, The function of searching for Loan Applications is running correctly, The function of Loan Applications is running correctly, The function of displaying the list of Financing Accounts is running correctly, The function of adding Financing Accounts is running correctly, The function of searching for Financing Accounts is running correctly, The function

of selling is running correctly, The function of displaying Journal transactions is running correctly, The function of adding Journals is running correctly, The function of searching for Journals is running correctly, The function of Journals is running correctly, The function of displaying the list of Financing Disbursement transactions is running correctly, The function of adding Financing Disbursement transactions is running correctly, The function of searching for Financing Disbursement transactions is running correctly, The function of displaying the home page is running correctly, The function of displaying the current balance sheet report is running correctly, The function of displaying the current transaction recapitulation report is running correctly, and The function of displaying the SHU report is running correctly. The score obtained from the expert assessment is 100%.

Usability Testing

Usability testing was conducted on 25 respondents consisting of 3 Cashier sections, 2 Customer Service sections, 5 Master sections, 2 Accounting sections, 3 Report sections, and 5 Logistics sections. The test results obtained were the percentage of Feasibility = 0.9064 x 100% = 90.6%.

Refining Prototype

The activities carried out at this stage are the prototype improvement stage based on the results of client feedback in stage 4. The response from the client was only a matter of the aesthetics of the reporting format so that in terms of programming design, in general, it was in accordance with the needs of the client

Implement product and maintain

Implementation is a stage where the design that has been made in the previous stage is translated into an information system that can be operated. The design that has been made is then translated using Visual Basic Tools combined with SQLServer which handles the database section into pages with functions that can be run. The implementation process is divided into two stages, namely database implementation and code implementation.

DISCUSSION

A prototype is an early sample, model, or product release built to test a concept or process to convert various abstract properties of an idea into something more tangible or visible resembling the actual result (Interaction Design Foundation, 2025), (Kustanto et al., 2024). System prototyping aims to collect information from users so that users can interact with the prototype model that is developed because the prototype describes the early version of the system so that users have a clear picture of the system that the development team will build (Pandowo et al., 2023)(Aprilisa & Aulia, 2024). Prototypes are much faster to build than finished implementations, so we can evaluate them faster and get feedback faster on the good and bad of a design (D. Yusuf & Ahmad, 2024). The following are the prototype stages in system development:

Requirements gathering and analysis

The initial stage of the prototype model begins with needs analysis (Liyanage, 2024). At this stage, system requirements are defined in detail. In the process, the client and the developer team will meet to discuss the details of what kind of system is needed by the user.The analysis is carried out to find out what components are in the running system, which can be hardware, software, networks and system users as the end user level of the system. The next step is to collect information needed by end users including the costs and benefits of the system being built or developed.System requirements analysis defines system requirements in the form of system input, system output, processes running in the system and the database used.

Quick design

The second stage is the creation of a simple design that will provide a brief overview of the system to be created. A new design can be created if the user's requirements are known. After that, the design can be made based on the requirement gathering and analysis in stage 1. Build prototype After the quick design is approved by the user, the next stage is the construction of the actual prototype which will be used as a reference by the programmer team for creating programs or applications.

User evaluation

After the prototype is created, the next stage is the evaluation stage by the user. At this stage, the system that has been created in the form of a prototype is presented to the client for evaluation. Furthermore, the user will provide comments and suggestions on the prototype that has been created. Prototypes are much faster to create than implementing a finished system, so users can evaluate them faster and provide faster evaluations of good and bad designs.

Refining prototype

The refining stage is the stage of improving the prototype based on the results of client feedback in stage 4. If the user does not have any revision notes from the prototype that was created, the team can continue to stage 6 for product implementation. If the client has notes for system improvements, then phases 4-5 will continue to repeat until the client agrees with the system to be developed. Implement product and maintainAfter the improvements in stage 5 are approved by the client, the next step is the implementation and maintenance stage. In this final phase, the product will be immediately created by the programmers based on the final prototype. Furthermore, the system will be tested and submitted to the client and the maintenance phase so that the system runs smoothly without any problems.

Functional Suitability Test Results

Based on the calculation results that have been carried out, the percentage of feasibility of the functional suitability aspect is 100%. Based on the Likert scale, the results of the functional suitability aspect test of the Cooperative Information System Design at the Karangrejo Independent Cooperative, Magetan obtained the category "Very Good". From these results, the Cooperative Information System Design at the Karangrejo Independent Cooperative, Magetan has met the functional suitability aspect.

Usability Test Results

Based on the results of the usability test and the calculations that have been carried out, the percentage of feasibility of the usability aspect obtained a result of 90.6%. These results are then converted into a qualitative value on a five-point Likert scale, obtaining the predicate "Very Eligible". From these results, the Cooperative Information System Design at the Karangrejo Independent Cooperative, Magetan has met the usability aspect.

CONCLUSION

Data and analysis results can be concluded, the results of the study are presented in the form of a blueprint which is used as a reference in the development of the cooperative information system at the Mandiri Cooperative. The design method used is a prototype which includes several stages, namely Requirements gathering and analysis, Quick design, build prototype, User evaluation, refining prototype, Implement product and maintain resulting in a structured design as the basis for system implementation. The architecture designed is a cooperative information system integrated in computer network technology.

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