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Analysis and Development of Village Office Administration Management Using Extreme Programming Method

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Abstract. This research aims to analyze and develop village administration management using Extreme Programming (XP) method. Village administration is crucial in delivering public services, managing local resources, and supporting sustainable regional development. The prominent challenges village administration faces include system limitations, the need for integration between sections, and technological barriers. In the context of software development for village administration, this research applies the XP method, which emphasizes intensive collaboration, adaptability to changing policies or needs, and continuous testing. The research steps involved comprehensive data collection, application development with prototype release, intensive user collaboration, and continuous improvement iterations. The results showed that the village administration application developed using the XP method could provide an adaptive solution to the dynamics of village administration. Users responded positively to the user interface and ease of use of the application. The dynamic features implemented responded to changes in village policies, while users rated the application's adaptability highly. With a user satisfaction rate of 90%, effective handling of technical issues at 95%, and positive performance stabilization results, the application is considered ready for full rollout.

1. INTRODUCTION

In the general context of village administration, it is imperative to understand the complexity of the tasks and responsibilities carried out by village-level governments. As the government unit closest to the community, village administration has a crucial role in providing public services, managing local resources, and supporting sustainable regional development. Effective village administration management covers aspects of service delivery and resource management and serves as a foundation for active community participation in the development process. Good village administration management creates an efficient bureaucratic order and can empower local communities. Effectively managing village administration creates an enabling environment for economic growth, social welfare, and sustainable community participation[1]–[3].

Effective village administration management is also crucial to addressing rural areas' various problems and challenges, including addressing inequalities, improving people's quality of life, and building resilience to social and economic change. Therefore, awareness of the importance of effective village administration management provides a solid foundation for designing and implementing innovations in village administration systems[4]–[6].

By strengthening village administrative management, we can create a platform where village governments can act as catalysts for positive transformation in the lives of their communities. Through practical management approaches, village governments can be more responsive to community needs, ensure equitable service delivery, and encourage active community participation in local development. Therefore, investing in developing effective village administration management is necessary and a strategic step towards building sustainable and inclusive rural communities[7], [8].

Issues in village administration are challenges that need to be addressed to ensure effective governance and quality public services at the local level. One of the central problems village administration faces is the need for more systems to manage its tasks efficiently and responsively to community needs. One of the most common problems is more integration and coordination between parts of the village administration system. Each function or unit within the village administration often works in isolation, resulting in inadequate information flow and prompt response to issues. This can hamper operational efficiency and delay providing services to the community[9]–[11].

Limited information technology and infrastructure are also severe problems in village administration. Many villages still need help in adopting information technology to improve administrative efficiency. Limited internet access, limited digital skills, and a lack of technological

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resources can hinder the implementation of modern and integrated administrative systems. In addition, there are often problems with data and information management. Unstructured data collection, storage, and processing can make it difficult for village administration to make informed and reliable decisions. This can hamper the village administration's ability to plan development and provide adequate services to the community[12], [13].

Addressing these issues is technical and involves cultural change and process improvement. Encouraging the adoption of appropriate technology, improving the skills of village officials, and strengthening coordination between village administration units can be strategic measures to overcome the limitations of existing administrative systems. By identifying and addressing these issues, village administration can become more responsive, efficient, and capable of providing better services to the community. The development of information technology has had a significant impact on village administration, changing how local governments manage resources and deliver services to the community. The application of information technology in village administration provides efficiency in operational processes and opens up opportunities to increase transparency, accountability, and community participation[14], [15].

In the context of software development for village administration, development methods are vital in ensuring project success and end-user satisfaction. One relevant development method is Extreme Programming (XP). XP is a software development approach emphasizing intensive collaboration, adaptability to changing needs, and continuous testing. XP encourages strong interaction between software development team members. In the context of village administration, this collaboration allows developers to work closely with stakeholders, such as village officials and the community, to understand the real needs. This can improve the accuracy of understanding the needs and result in a more suitable solution. As village administration can experience changes in policies, regulations, or community needs, XP, which emphasizes adaptability, can be an effective solution. The ability to respond to changes quickly ensures that the software developed remains relevant and valuable[16]–[21].

In the context of village administration, software reliability is critical. XP emphasizes continuous testing throughout the development process, which can help identify and fix potential bugs or problems quickly, ensuring the safety and stability of the system. XP adopts an iterative approach with short development periods. In village administration, software can be released periodically with improved functionality. This provides flexibility and allows relevant parties to utilize new features immediately. The village administration can speed up the software development process by applying development methods such as Extreme Programming, improving responsiveness to changing needs and producing solutions better suited to the local context. This is an essential step in harnessing the positive potential of information technology to support the effectiveness of village administration and improve services to the community[22]–[25].

This research makes a significant theoretical contribution to understanding and developing concepts related to village administration and software development methods. The research results can enrich the literature by digging deeper into the theoretical aspects of village administration management. This contribution can provide new insights and a deeper understanding of the dynamics of village administration and software development at the local level. This research has practical implications that can provide guidance and solutions for practitioners, village governments, and related parties in improving the effectiveness of village administration. The results can provide direction in addressing problems commonly faced in village administration and provide insight into how the application of information technology and software development methods, such as Extreme Programming, can result in positive changes in public service delivery and local resource management. Based on the research findings, several recommendations can be made to develop a better village administration system. These include practical suggestions for information technology integration, human resource capacity building, and implementation strategies for appropriate software development methods. These recommendations can provide a foundation for policy development and concrete actions to improve village administration and provide a basis for system developers to design more effective solutions. Overall, the benefits of this research are not only limited to the theoretical level but can also be felt directly in the practice of village administration. The practical implications

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and recommendations generated can serve as valuable guidelines for decision-makers, practitioners, and related parties to improve the overall quality of village administration services and management.

2. METHOD

This research integrates the dimensions of data collection, technology development, and user acceptance evaluation, the research stages as shown in Figure 1. This holistic approach ensures that the solution not only meets the needs of the village administration but is also accepted and used effectively by the end users.

Figure 1. Research Stages

Data Collection

The initial stages of this research involved comprehensive data collection related to village administration and user needs. Data on administrative processes, constraints faced, and user expectations and needs were carefully collected through interviews, observations, and documentation analysis. This stage aimed to gain an in-depth understanding of the context of village administration that would form the basis for application development.

Application Development

After the data was collected, the next stage focused on developing the village administration application. A software development method approach, such as Extreme Programming (XP), was applied based on the identified needs. Intensive collaboration with users and stakeholders was conducted to ensure that the features developed aligned with expectations and could provide concrete solutions to existing problems. The implementation of short iterations allowed for the gradual release of the software, allowing users to provide further input and ensuring that the software remains relevant to the changing dynamics of village administration.

User Acceptance Analysis

After implementation, a user acceptance analysis phase is conducted to evaluate how the users receive and use the application. Users ' responses to the application are evaluated through questionnaires, interviews, or direct observation. Usability, feature understandability, and user satisfaction are the main focus of this analysis. The results of the user acceptance analysis will provide an in-depth understanding of the successful implementation of the village administration application. By understanding user perspectives and experiences, this research can provide valuable insights for further improvements, feature changes, or advanced development opportunities that can improve the quality and acceptance of the application.

3. RESULTS AND DISCUSSION

User Needs

With a comprehensive data collection phase in place, details of administrative processes include population data, statistics on administrative services such as ID cards and moving papers, and village financial structure and governance. Key variables include demographic data, service turnaround times, and budget allocations for each village administrative unit. The data shows the average document handling time, the number of pending documents, and reports of errors in data management. Technological constraints can be represented by data on internet speed, successful use of computer systems, and staff understanding of information technology. Data includes the results of user interviews regarding the desire for increased efficiency, reduction of data errors, and demands for accessibility of information in the village administration system.

User expectations can be represented in the form of user interface preferences, desired additional functionality, and feature priority levels. Data collected includes statistics on the extent to which each village administration unit is involved in administrative processes and how data is exchanged. Correlation analysis between variables can form the basis for identifying focal points for

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application development. Data includes comparisons between conditions before and after the implementation of the village administration system, including measurements of efficiency and data accuracy. Validation of research objectives can be measured by looking at performance improvements and fulfillment of user needs based on data before and after application development.

Application Development

Prototype

In the First Prototype Release stage, the village administration application development project reached a significant milestone by successfully releasing the first version of the prototype. The data and features generated at this stage provided an invaluable initial overview of the progress and quality of the prototype. This prototype includes 50 data collection forms, reflecting the diversity of information that the application can accommodate. The data collection process became more structured and efficient, providing a reliable means of recording important information related to residents and village administrative activities.

The user interface in the prototype was designed with simple navigation and search features, providing users with an intuitive and easy-to-use experience. Proper interface design steps will help users interact with the app without difficulty, increasing usage effectiveness and interest in using the app. The importance of the basic features in the app's development is reflected in the fact that 80% of the features were implemented in the prototype. Integrating most of these essential features shows significant progress in achieving the development goals while also providing an overview of the prototype's ability to meet the basic needs of village administration. With the number of forms, user interfaces, and essential features implemented, this prototype provides a strong foundation for further development. The results of this First Prototype Release stage prove that the project is on the right track, and the feedback from users at this stage can be the basis for further refinement to achieve an optimal solution for village administration.

Intensive Collaboration with Users

In the Intensive Collaboration with Users phase, the village administration application development team conducted a series of collaborative meetings with users and stakeholders. The data generated from these collaborations shows how effectively the team interacted with and obtained valuable input from key stakeholders. With a meeting frequency of 4 times per month, the team ensured that interactions with users were not one-offs but were conducted at regular intervals. This allows the team to continuously receive feedback and ensure that app development is always on track with user expectations and needs. Positive results emerged from user feedback, with 90% of users responding positively to the user interface and app's ease of use. This reflects that the interface design has met user satisfaction standards, making the application more accessible for end users to understand and operate. In addition, the active participation of 85% of stakeholders in the discussion and decision-making sessions indicates a high level of involvement from those who have a strategic role in the project's success. This involvement can help the team accommodate various perspectives, needs, and expectations so that the application can cover as many aspects relevant to the village administration context as possible. Overall, this intensive collaboration enriched the app development with deep user insights and strengthened the active engagement of stakeholders, creating a solid foundation for the further development and successful implementation of the village administration app.

Continuous Improvement Iteration

In the Iteration and Continuous Improvement phase, the village administration application development team continued the evolution of the prototype by adding new features and improving functionality based on user feedback. This process signaled the team's commitment to continuously improve and refine the application to meet the evolving needs of users and stakeholders. The first iteration focused on user feedback, which led to the addition of an advanced search feature. This feature was designed to give users more ability to search for data with more specific criteria, improving the efficiency of searching for information within the application. The improved functionality for managing village financial reports is a significant step in responding to complex administrative needs. By adding this feature, the application can more effectively assist villages in managing budgets, creating financial reports, and optimizing financial resources. In addition, the

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update to the resident data update feature is a direct response to user feedback. By updating this feature, the application can be more responsive to changes in resident information, improving the accuracy and sustainability of existing data. The Iteration and Continuous Improvement phase reflects the development team's commitment to creating a dynamic and responsive solution. The enhancements made were not only based on internal evaluations but were also driven by continuous interaction with users, putting user needs and expectations at the forefront of app development. These steps ensure that the application continues evolving to the changing village administration environment and user needs.

Feature Implementation as Needed

In the Implementing Features as Required stage, the village administration application development team focuses on implementing features identified as critical needs by users and stakeholders. This process involves integrating these features into the application as a whole, improving the functionality and performance of the system to meet high standards of data security and accessibility. Table 1 shows that each feature has been fully integrated into the application at the Implementing Features as Required stage. The data provides an overview of the implemented functionality, ensuring the application can manage data collection forms, document management, and security systems according to user and stakeholder needs.

Table 1 Results of Feature Implementation as Needed

Stage	Feature Implementation
Data Collection Form	Full integration of formulas for data collection
	Ease of form access by users
Document Management	Digital archive for document management
	Accessibility of village officials to the archive
Security System Upgrade	Encryption of sensitive data
	Strict access control
	Security audit for activity monitoring

Relevance to the Dynamics of Village Administration

With the addition of information on the development team's response to user feedback, the types of changes implemented in dynamic features, and user responses to the application's adaptability, Table 2 provides a complete picture of the interactions and outcomes of the Relevance to the Dynamics of Village Administration stage.

Table 2 User Feedback

Stage	User Participation	User Response
Input for Village Administration Change	80% of users actively provide feedback	Proposed terrain features Interface improvements Additional report requirements
Implementation of Dynamic Features for Village Policy	Features can customize policy changes	Adjustment of forms according to policy changes Integration of new financial reporting module
User Response to Adaptability	90% of users respond positively	Recognition of application flexibility Recognition of quick response to policy changes

User Acceptance Analysis

The app performance stabilization results show that the app is ready for full launch. Data from performance monitoring validate that the application can handle the expected workload and respond consistently. This indicates that the app's infrastructure and architecture have been adequately tested and optimized. User trials showed a 90% satisfaction rate with the application's performance. This result reflects that users were satisfied with the application's interface, functionality, and performance, indicating that the application development has reached the expected satisfaction standard. 95% of the technical issues identified during the pilot test have been successfully fixed. Proactive action in addressing and fixing technical issues provides confidence that the app will be able to operate

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smoothly and efficiently when launched. The application was deemed ready for full launch with high user satisfaction levels, effective handling of technical issues, and positive performance stabilization results. This readiness evaluation provides confidence that the app has undergone sufficient testing and enhancements to add significant value to users and stakeholders.

4. CONCLUSION

This research contributes significantly to analyzing and developing village administration management by applying the Extreme Programming (XP) method. As an essential element of local government, village administration plays a crucial role in providing public services, managing local resources, and supporting rural development. Focusing on software development, this research demonstrates that the XP method can provide solutions that are adaptive to the complexity and dynamics of village administration. Intensive collaboration with users and stakeholders ensures that the resulting application not only fulfills the basic needs of village administration but is also well received by end users. The dynamic features implemented in the app respond to changes in village policies, while the app's ability to adapt quickly received positive responses from users. Positive conclusions were drawn from user trials, where satisfaction levels reached 90%, and effective handling of technical issues reached 95%. Thus, the results show that applying XP methods in developing village administration applications can create responsive, efficient, and reliable solutions. This success is evident from a technical perspective and from the active participation of users and stakeholders in the development process. In conclusion, this research provides a solid theoretical basis and practical implications that can guide practitioners, village governments, and related parties to improve the effectiveness of village administration. Applying information technology with appropriate software development methods can create an adaptive, efficient, and competitive village administration.

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