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Regional Potential Information System: Implementing Extreme Programming Methodology for Sustainable Development

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ABSTRACT

This research focuses on developing a Regional Potential Information System by applying the Extreme Programming (XP) method. This system aims to collect, manage, and present information related to the potential and resources owned by a region, involving aspects such as natural, cultural, economic, social, and infrastructure resources. The research stages include comprehensive data collection, application development with the XP Method, and user acceptance analysis. Data collection involved interviews, document analysis, and field surveys to form the basis of system functionality. Application development was conducted iteratively, focusing on improving functionality that is adaptive and responsive to change. User acceptance analysis involved evaluations from local governments, companies, and communities. The results showed success in designing the system structure, adding functionality incrementally, and getting positive feedback from stakeholders. The contribution of this research lies in the in-depth understanding of the application of the XP Method in the development of the Regional Potential Information System, providing direct practical benefits and a policy basis for the local government.

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INTRODUCTION

Regional Potential Information System is an information technology platform that aims to collect, manage, and present information related to the potential and resources owned by a region. Regional potential includes natural resources, culture, economy, society, and infrastructure. With the implementation of this information system, it is expected that stakeholders, such as local governments, companies, and communities, can gain a better understanding of the existing potential and make more informed decisions. The development and implementation of the Regional Potential Information System are inseparable from several challenges that must be overcome. One of the main challenges is integrating data from various diverse sources, including geographical, economic, and social data. In addition, the need to develop a responsive and adaptive system to address dynamic changes in regional potential is also a challenge. Data security and information privacy are critical

aspects that must be considered for the system to be trusted and recognized by all stakeholders[1], [2].

Although faced with challenges, developing the Regional Potential Information System also brings significant opportunities. One of these is increasing transparency and accountability in managing regional potential. By providing easy and open access to information, communities can actively participate in decision-making and monitor resource management. In addition, opportunities to enhance cooperation between agencies and sectors can be realized through effective data exchange[3]–[6]. Utilizing the latest technologies, such as artificial intelligence and extensive data analysis, is also an excellent opportunity to improve the quality of analysis and predictions related to regional potential. Local governments and other stakeholders can make more intelligent and strategic decisions using these technologies[7]–[13].

Overall, the Regional Potential Information System has great potential to improve resource management and sustainable regional development. By understanding the challenges and capitalizing on the opportunities available, implementing this information system can be a significant step towards empowered and sustainable development. The development of information technology has become a key driver in exploring regional potential more effectively and efficiently[5], [6]. With the widespread adoption of information technology, local governments and various stakeholders have faster and easier access to data and information related to natural resources and economic, social, and infrastructure potential. Integrating modern information systems allows for more in-depth data analysis, providing an accurate picture of potential and aiding more informed decision-making. In developing software, software development methodologies are vital in ensuring project success. The methodology provides a software planning, analysis, design, testing, and implementation framework. The success of a software project often depends on choosing the proper development method according to the project's needs[14]–[21]. The Extreme Programming (XP) method is one of the software development methods that emphasizes team collaboration, flexibility, and rapid response to changing needs. By utilizing an iterative and incremental approach, XP focuses on developing adaptive software that can be changed easily according to changing business needs. The relevance of the Extreme Programming (XP) Method in the development of the Regional Potential Information System is very significant. With a dynamic and often changing environment in managing regional potential, XP provides the right approach to overcome this challenge[22]–[26].

The XP method allows the development team to respond quickly to changing needs or priorities in developing the regional potential information system. Close collaboration between the development team and stakeholders, such as local governments, companies, and communities, is essential in identifying and developing features that suit local needs. Continuous testing in the XP Method helps ensure product quality and identify problems early, which is critical for information systems that require high accuracy and reliability. The iterative and incremental approach in XP suits the development of information systems that

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require incremental improvements and periodic evaluation to ensure the availability of better features over time. By applying the Extreme Programming (XP) Method in developing the Regional Potential Information System, it is hoped that it can create a solution that is adaptive, high quality, and by dynamic needs in managing and optimizing regional potential[20], [27], [28].

This research makes a theoretical contribution by providing new and in-depth insights related to using the Extreme Programming (XP) Method in developing the Regional Potential Information System. This theoretical contribution can broaden the understanding of software development methods and their application in the context of regional potential management. The research results can be an essential reference for academics, researchers, and practitioners in understanding the principles of XP and how they can be adopted in software development projects that focus on regional potential. Regarding practical contributions, this research directly benefits relevant stakeholders, including local governments, companies, and communities. Implementing the Extreme Programming (XP) Method in the development of the Regional Potential Information System can produce more adaptive software products that are easy to change and meet the region's actual needs. Successful development can increase efficiency, transparency, and community participation in managing regional potential.

This research also provides significant policy implications. The research results can be the basis for local governments to formulate policies related to using the XP Method in software development projects supporting regional potential management. Policies supporting the adoption of this technology can create an environment conducive to innovation and the development of more effective information systems. In addition, policy implications can also influence other stakeholders, such as companies and communities, in sustainably optimizing regional potential. Overall, the benefits of this research summarize theoretical contributions that broaden understanding, practical contributions that improve efficiency, and policy implications that create a basis for technology adoption in the context of developing Regional Potential Information Systems.

METHODS

Data collection provides the foundation for application development, and results from user acceptance analysis provide feedback that can be used for improvement and further development. The research aims to create an effective, adaptive, and acceptable Regional Potential Information System for stakeholders. Each stage of this research is interrelated and supports each other as shown in Figure 1.

Figure 1. Research Stages

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Data Collection

The first phase of this research focused on collecting comprehensive data related to the region's potential to be integrated into the Information System. This data covered various aspects, including geographical, economic, social, and infrastructure data. Data collection methods include stakeholder interviews, document analysis, and field surveys. The data obtained from this stage will be the basis for designing the information system's functionality to suit the region's needs.

Application Development

After collecting the data, the next stage is application development using the Extreme Programming (XP) Method. The development team will design, implement, and test periodic system iterations collaboratively. The iterative and incremental approach of the XP Method allows for quick adjustments based on feedback from stakeholders. The process involves developing system modules incrementally, ensuring that each iteration adds significant value.

User Acceptance Analysis

Once the application development has reached an adequate stage, the research will move on to the user acceptance analysis stage. This involves evaluating the system by key stakeholders, including local governments, companies, and communities. Collecting feedback from users will provide valuable insights into the app's success in meeting their needs and expectations. User acceptance data will help the development team make final adjustments before fully launching the system.

RESULTS AND DISCUSSION

In the data collection phase, the research team managed to gather a diverse and comprehensive dataset related to the potential of the regions that were the focus of the research. This data covered a range of vital aspects that reflected the area's geographical, economic, social, and infrastructure conditions. The data collection method involved several effective strategies; the results of this stage are shown in Table 1.

Table 1. Description of Regional Potential Data

Data Type	Desc.
Geographic Data	Maps and satellite images of the region, providing a visual depiction of geographic characteristics.
	Spatial data that includes land use, soil type and other geographical structures.
Economic Data	Regional economic statistics, including economic growth, leading sectors, and contribution to regional domestic product.

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	Employment and unemployment data to understand labor market dynamics in the area.
Social Data	Population demographics, including age, gender, and population distribution.
	Education and public health data, providing important information related to social welfare.
Infrastructure Data	Inventory of existing infrastructure, such as roads, bridges, and other public utilities.
	Availability of public services, such as schools, hospitals, and other public facilities.

The data collected at this stage provided a solid foundation for developing the Regional Potential Information System. The diversity and accuracy of the data allow the development team to design system functionality that suits the needs and aspirations of the region. The data collection results will also be the basis for further analysis in the next stage, making this research sustainable and relevant to the changing dynamics of regional potential.

Application Development

The application development phase using the Extreme Programming (XP) Method has achieved significant results. The development team has worked collaboratively and iteratively to design, implement, and periodically test the system. The results of this stage of application development:

1. System Design

The development team has successfully designed the system structure, considering the stakeholders' needs and ensuring the mapping of relevant key functionalities from the collected data. The team successfully identified the critical needs of stakeholders, including the local government, companies, and local communities. The active involvement of stakeholders in this process ensured that the system design met their expectations and needs. The key functionalities of the system have been successfully identified and mapped based on the data collected in the previous data collection phase. This mapping covers various aspects, such as geographic data visualization, economic data processing, social information management, and infrastructure integration.

The system architecture has been carefully designed to support the desired functionality and ensure system scalability. The selection of technologies and platforms that fit the project needs has been integrated into the architecture design. The user interface (UI/UX) design was created with attention to sustainability, clarity, and optimal user experience. The interface is intuitive and easy to use to ensure maximum end-user accessibility. System security aspects have been integrated into the design, protecting sensitive data and preventing potential security risks. Security strategies include user authentication, data encryption, and protection against cyber threats.

The outcome of the system design stage creates a solid framework for subsequent implementation. A careful and detailed design ensures that the development team has clear and detailed guidelines for building the system. The mapping of critical functionalities also provides a solid basis for assessing whether stakeholder needs have been met. In addition, a good design has helped identify potential problems or shortcomings early on, allowing for necessary adjustments before full implementation.

2. Iterative Implementation

The iterative implementation stage in application development using the Extreme Programming (XP) Method has resulted in various significant achievements. Each iteration is designed to increase functionality, contributing to the overall system. The following are the results of the iterative implementation stage:

- Functionality Enhancement
    a. Each iteration in the application development successfully added new functionality that provided significant added value to the system.
    b. Actual needs and feedback from stakeholders direct feature selection and system changes.
- Rapid Response to Change
    a. Each iteration in application development successfully adds new functionality that adds significant value to the system.
    b. Actual needs and feedback from stakeholders direct feature selection and system changes.
- Integration of stakeholder feedback
    a. Each iteration in application development successfully adds new functionality that adds significant value to the system.
    b. Actual needs and feedback from stakeholders direct feature selection and system changes.
- Quality reinforcement
    a. Each iteration in application development successfully adds new functionality that adds significant value to the system.
    b. Actual needs and feedback from stakeholders direct feature selection and system changes.
- Collaborative process
    a. Each iteration in application development successfully adds new functionality that adds significant value to the system.
    b. The actual needs and feedback from stakeholders direct feature selection and system changes.

The iterative implementation results in a responsive and adaptive development cycle. By adding functionality incrementally and responding quickly to changes, the development team has created a solution that matches the region's actual needs and potential dynamics.

The collaborative process and integration of stakeholder feedback made the app development more efficient and effective, ensuring that the result met evolving expectations and needs.

User Acceptance Analysis

The User Acceptance Analysis stage marks a critical step in developing the Regional Potential Information System. The evaluation of the system by key stakeholders, including local governments, companies, and communities, has resulted in several significant findings. The following are the results of this stage:

1. Evaluation by Local Government
    a. Geographic data visualization maps are helpful in regional planning and management.
    b. The economic analysis module helps an in-depth understanding of the region's economic growth.
    c. Request for additional features related to natural disaster risk monitoring and analysis.
2. Evaluation by Company
    a. Integrated infrastructure data supports investment decision-making.
    b. The planning team appreciated the clean and straightforward user interface.
    c. Demand for improvement in infrastructure data visualization to provide a more detailed perspective.
3. Evaluation by the Community
    a. The social and cultural information module received a positive response from the community.
    b. The user-friendly user interface improves information accessibility.
    c. Requests for improved social information sharing features and interface updates based on community feedback.

The user acceptance analysis stage results provide confidence that the application has met the desired standards and expectations of the stakeholders. Final adjustments before launch ensure the system is ready for use with optimal performance. User acceptance data will continue to be monitored after launch to ensure continued user satisfaction and identify future improvement areas.

CONCLUSION

This research comprehensively investigates the development of a Regional Potential Information System using the Extreme Programming (XP) Method approach. Various stages, from data collection to user acceptance analysis, form the foundation for understanding the

potential and challenges in managing information related to regional potential. The development of this system details the great potential in improving resource management and sustainable regional development. Key challenges include data integration from multiple sources, responsiveness to dynamic changes, and data security and information privacy. Data collection successfully generated a comprehensive and diverse dataset, forming the basis for system design. System design and iterative implementation with the XP Method showed significant achievements, with rapid response to change and quality reinforcement. Evaluations by stakeholders, including local governments, companies, and communities, yielded positive results regarding application functionality. The critical elements appreciated were geographic data visualization maps, economic analysis modules, and social and cultural information. The research results provide a basis for local governments to formulate policies for adopting the XP Method in software development projects. Policies that support adopting these technologies can create an enabling environment for innovation and the development of effective information systems. Thus, this research paves the way for developing adaptive, high-quality, and dynamic needs-oriented information systems in managing and optimizing regional potential. Overall, this research encourages the realization of sustainable development through the use of information technology with appropriate and innovative approaches.

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