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Optimizing Data-Based Decision Making: Development And Implementation Of Decision Support System In Langkat Regency Government

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ABSTRACT
Effective decision-making in local government is essential to improve the quality of public services and policies. The Langkat Regency Government faces challenges in managing data efficiently due to the limited integrated information system. This study aims to develop and implement a Decision Support System (DSS) to support data-based decision-making in local government. Using a mixed-method approach, data were collected through observation, interviews, questionnaires, and document analysis from related agencies. The developed DSS prototype integrates cloud computing and artificial intelligence to accelerate data analysis and generate policy recommendations. The results showed that DSS increased data processing time efficiency and decision accuracy by 40%. However, challenges such as resistance to change and limited infrastructure are still obstacles. Therefore, a strategy to increase human resource capacity and digitalization policies is needed to ensure the sustainability of DSS.

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INTRODUCTION

In the ever-evolving digital era, data-based decision-making has become an important need for various sectors, including government. The right decisions in public administration can improve policy effectiveness, budget optimization, and public welfare. Local governments, including Langkat Regency, are faced with complex challenges in managing resources, setting development priorities, and providing efficient and transparent public services. The decision-making process in government is often influenced by subjective factors, limited information, and less flexible bureaucratic mechanisms.[1]. Therefore, a system is needed that can help policy makers in processing data quickly and accurately to produce more objective and measurable decisions. One solution that can be applied is the Decision Support System (DSS), which is designed to provide analytical support in the data-based decision-making process in government environments.

Although the DSS concept has been widely applied in the business and industrial sectors, its implementation in local government environments still faces various challenges. One of the main problems is the minimal use of data-based technology in supporting strategic

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decision making.[2]. In Langkat Regency, decision-making in the government sector still relies heavily on manual reports and subjective experiences of policy makers. This can lead to inconsistencies in public policy and delays in responding to existing problems. In addition, the available information systems are not yet fully integrated and have not been able to provide predictive analysis that can assist the government in determining long-term policies. Therefore, this study seeks to develop and implement a DSS model that can improve the quality of decision-making in the Langkat Regency government.[3].

The main objective of this research is to develop a decision support system that can help the Langkat Regency government in analyzing data, optimizing work program planning, and increasing the efficiency of public services.[4]. Specifically, this study aims to: (1) identify the needs and challenges in implementing DSS in the local government environment, (2) design a DSS model that suits the specific needs of the Langkat Regency government, and (3) evaluate the effectiveness of DSS in increasing the speed and accuracy of administrative decision-making and public policy. With the existence of DSS, it is hoped that the decision-making process in the Langkat Regency government environment can be more systematic, transparent, and based on valid data.

Several previous studies have discussed the application of DSS in various sectors, including in government. However, there are still some gaps in previous research that need to be fixed. First, most DSS research in the government sector still focuses on technical aspects without considering social and organizational factors that influence technology adoption.[5]. Second, there are still few studies that develop DSS models specifically for local government environments by considering the characteristics of local bureaucracy and policies. Third, previous studies rarely conduct concrete case study-based evaluations in the context of local government. Therefore, this study aims to fill this gap by developing a DSS model that is not only technology-based, but also takes into account institutional aspects and the specific needs of the Langkat Regency government in decision making.

This research has several important contributions to the development of information systems in the government sector. From an academic perspective, this research enriches the literature on DSS by adding an implementation perspective in the local government environment. From a practical perspective, this research provides a concrete solution for the Langkat Regency government in improving the quality of data-based decision making. With the existence of a DSS specifically designed for the needs of local government, it is hoped that public policies can be made more effectively, efficiently, and evidence-based (evidence-based policy)[6]. In addition, this research can also be a reference for other local governments in adopting DSS technology to support better governance.

METHOD

This study uses a qualitative and quantitative descriptive approach (mixed-method research) to develop and evaluate the Decision Support System (DSS) to support decision making in the Langkat Regency government.[7]. This method was chosen because it allows the research to explore the problem in depth through empirical data analysis while simultaneously testing the effectiveness of the system developed.[8].

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This study uses a mixed-method research approach, which combines qualitative and quantitative methods. This approach was chosen to obtain a comprehensive picture of the implementation of the Decision Support System (DSS) in the Langkat Regency government. Data were collected through various techniques, including direct observation, in-depth interviews with officials and employees in related government agencies, and distributing questionnaires to employees to determine their perceptions of the need for and effectiveness of DSS in supporting decision making.

In addition, document analysis was also conducted to study the procedures and policies in force in the Langkat Regency government, as well as to identify potential gaps in the data processing and decision-making systems. This study focuses on the Regional Development Planning Agency (Bappeda) and several related agencies as the main locations for the DSS prototype trial. In developing this system, cloud computing and artificial intelligence-based technology are used to automate data processing and provide evidence-based policy recommendations.

To measure the effectiveness of the developed system, a system trial was conducted using the Technology Acceptance Model (TAM), which assesses the extent to which the DSS is accepted and used by users in the Langkat Regency government. Furthermore, a comparative analysis was conducted on decision making carried out before and after the implementation of the DSS to measure differences in terms of speed, accuracy, and quality of decisions produced. This research method combines a comprehensive approach to ensure that DSS implementation can be evaluated objectively and provide valid insights into its potential application in local government.

RESULTS AND DISCUSSION

Analysis of DSS System Needs in Langkat Regency Government

Based on the results of interviews and observations of several agencies in Langkat Regency, it was found that the decision-making process is still dominated by conventional methods based on subjective experience and manual reports. Some of the main obstacles identified in the decision-making process include:

a. Lack of data integration between agencies, so that policy analysis is often carried out sectorally without considering cross-sector data.
b. Slow data processing and reporting processes, which causes delays in responding to public problems.
c. Minimal use of data-based technology to support strategic decision making.

The results of the questionnaire given to government employees showed that 85% of respondents stated the need for a system that can automate data analysis, while 73% of respondents admitted that they still rely on manual reports in preparing policy recommendations. Thus, there is a real need to implement DSS to improve the efficiency and quality of decisions in the Langkat Regency government environment.

DSS Prototype Development and Implementation

Based on the results of the needs analysis, this study developed a DSS prototype designed to assist the Langkat Regency government in:

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a. Integrating data from various agencies into one cloud computing-based system.
b. Provides predictive analysis features based on artificial intelligence (AI) to provide more accurate policy recommendations.
c. Increase the speed of data processing and reporting, so that decision making can be done in real-time.

VThe prototype of the DSS system was tested at the Regional Development Planning Agency (Bappeda) of Langkat Regency and several related agencies. The test results showed that with DSS, the data analysis process that previously took up to 3-5 days can be shortened to less than 24 hours. In addition, the simulation results showed that the accuracy of policy recommendations provided by DSS increased by 40% compared to conventional methods.

Discussion

Improving Decision Making Effectiveness with DSS

The results of the study indicate that the application of DSS in the Langkat Regency government environment can increase the effectiveness of decision making. With the availability of fast and accurate data analysis, policy makers can make more targeted decisions, especially in planning development programs and regional budget allocation.

Compared to conventional systems, DSS allows:

a. Reduction of subjective bias in decision making as decisions are based on data and predictive analytics.
b. Increased transparency, because all data used can be traced and verified by various parties.
c. Increased time efficiency, which is very important in responding to community problems quickly.

Challenges and Inhibiting Factors in DSS Implementation

Although the test results show the effectiveness of DSS in improving decision making, there are several challenges in its implementation, including:

a. Resistance to change: Most government employees are still accustomed to manual systems and are less familiar with DSS-based technology.
b. Suboptimal data availability: Several agencies still have limitations in providing structured data that can be accessed in real-time.
c. Technology infrastructure constraints: Several agencies in Langkat Regency still do not have adequate technology infrastructure to fully support the DSS system.

To overcome this challenge, efforts are needed to increase human resource capacity through training in the use of DSS, strengthening inter-agency data integration policies, and investing in the development of information technology infrastructure within the Langkat Regency government.

Research Implications for Local Government Policy

The results of this study provide several important implications for governance in Langkat Regency, including:

a. The need for a government digitalization policy to encourage the use of DSS in decision making.

b. The importance of inter-agency collaboration in providing and managing data in an integrated manner.
c. Increasing the adoption of artificial intelligence-based technologies to improve the accuracy and effectiveness of public policies.

From an academic perspective, this research also contributes to the development of literature related to DSS in local government, especially in the context of data-based decision making in the Indonesian bureaucratic environment.

CONCLUSIONS

This study shows that the implementation of Decision Support System (DSS) in Langkat Regency government can improve the effectiveness of decision making by reducing subjective bias, increasing transparency, and accelerating the data analysis process. However, challenges in terms of technology adoption, data integration, and human resource readiness still need to be considered to ensure the sustainability of this system in the long term. Therefore, policies are needed that encourage government digitalization and HR training so that DSS can be adopted more widely in the governance process in Langkat Regency.

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