

The Application of Database Management and Business Intelligence in Supporting Organizational Information Management

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ABSTRACT

The development of information technology has encouraged organizations to manage data more effectively to support accurate decision-making. Data management that still uses traditional file systems often causes various problems, such as data redundancy, inconsistent information, low flexibility, and difficulty in sharing data across different parts of the organization. This article discusses the basic concepts of database management, Database Management Systems (DBMS), database design, as well as the application of Business Intelligence technology in improving the quality of organizational information management. In addition, the article also outlines the development of modern data management technologies, such as relational databases, NoSQL, data warehouses, Hadoop, in-memory computing, Online Analytical Processing (OLAP), data mining, text mining, and web mining. The discussion shows that applying integrated database technology can boost operational efficiency, speed up decision-making, and provide more accurate, relevant, and timely information for the organization.

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1. INTRODUCTION

Information is one of the most important assets for an organization in carrying out operational activities and making decisions. Quality information needs to be accurate, relevant, and available at the right time to effectively support various business activities. The quality of information is greatly influenced by how the organization manages the data it has. As organizations grow, the amount of data generated also increases significantly. Different parts of the organization, such as finance, marketing, human resources, and production, produce large amounts of data every day. If this data is managed using standalone traditional file systems, the organization will face various problems like data duplication, inconsistent information, and difficulties in integrating data across departments.

The development of database technology offers solutions to various weaknesses of traditional file systems through the use of Database Management Systems (DBMS). This system allows organizations to manage data centrally, which can improve storage efficiency, security, ease of access, and information quality. In addition, the advancement of information technology has also given birth to the concept of Business Intelligence, which utilizes various analytical technologies to process data into strategic information that supports decision-making. This article discusses various important aspects of organizational data and information management. The discussion begins with data management in traditional file environments along with the various problems it causes, such as data redundancy, data inconsistency, and limitations in sharing information. It then goes on to discuss the concept of database management systems (DBMS), relational databases, and the development of non-relational (NoSQL) databases.

This article also explains the process of database design, including normalization and Entity Relationship Diagrams (ERD), aiming to create an efficient and integrated data structure. The next section discusses the implementation of Business Intelligence, Big Data challenges, and various supporting technologies such as Data Warehouses, Data Marts, Hadoop, and in-memory computing. In addition, the article describes various modern analytic tools, such as Online Analytical Processing (OLAP), Data Mining, Text Mining, and Web Mining, which are used to uncover hidden patterns, trends, and relationships in data to support more effective decision-making. Through this discussion, the article aims to provide an understanding of the importance of database management and Business Intelligence technology in improving operational efficiency, information quality, and an organization's ability to make accurate, data-driven decisions.

2. METHODS

This article uses library research. Data is obtained from various literature sources that discuss the Application of Database Management and Business Intelligence in Supporting Organizational Information Management. The analysis is carried out descriptively by interpreting relevant concepts to explain the role of communication technology in supporting modern organizational activities.

3. FINDINGS AND DISCUSSION

Data Management in a Traditional File Environment

Data management is an important part of information systems because all of an organization's business processes rely on accurate, complete, and easily accessible data. Before the rise of modern database technology, most organizations used traditional file systems as a way to store data. In these systems, each work unit or department developed its own applications and data files according to operational needs. While this approach could meet needs in the early stages of organizational development, as data volume and business process complexity grew, traditional file systems showed various limitations.

In a computer system, data is organized in a hierarchy that starts with bits, which are the smallest data unit and can only have a value of 0 or 1. A collection of bits forms a byte, which represents a single character, like a letter, number, or symbol. Then, several characters make up a field, which is a set of data representing a single attribute, such as a student's name or ID number. Several related fields form a record, which is a collection of information about a particular entity. A set of records forms a file, while several related files make up a database.

Each record represents an entity, which is an object that is the focus of storing information, such as a student, lecturer, customer, or product. Each entity has a number of attributes that describe

its characteristics, for example, name, address, date of birth, or identification number. Organizing data systematically is very important so that the information produced can support both operational needs and organizational decision-making. In traditional file environments, each part of the organization has its own data files, so it often happens that the same data is stored in several different files. For example, the finance department stores employee data for payroll purposes, while the human resources department also stores employee data for personnel administration. This situation causes data to be spread across various standalone systems, making it difficult to integrate.

Environmental Issues of Traditional Files

Using traditional file systems causes various problems that affect the quality of information and organizational efficiency.

1. **Data Redundancy and Inconsistency** Data redundancy happens when the same data is stored in more than one file or system. Storing data repeatedly wastes storage space and also increases the risk of inconsistent data. If information is changed in one file but not updated in the other, the organization will end up with multiple versions of the data. This reduces the accuracy of information and can lead to mistakes in decision-making. Additionally, differences in naming standards or data coding across parts of the organization can make inconsistencies even more likely. For example, one system uses the code "XL" to indicate clothing size, while another system uses "Extra Large." These differences make it harder to integrate data from different systems.
2. **Dependence between Program and Data (Program–Data Dependence)** In traditional file systems, data structures are highly dependent on the application programs that use them. If there is a change in the data structure, then all programs that use that data must also be adjusted. For example, changing the postal code format from five digits to nine digits requires all applications using that data to be updated. This situation increases the cost of system development and maintenance.
3. **The lack of flexibility in traditional file-based environmental systems** can only produce pre-designed reports. When management needs a new report or specific analysis, the organization has to make changes to the application programs. This process takes a lot of time, effort, and money, making the organization less responsive to rapidly changing information needs.
4. **Weak Data Security** Data stored in various separate files makes access control harder to manage. Organizations have a hard time figuring out who has the right to access, update, or change certain data. As a result, the risk of data loss, misuse of information, or unauthorized data changes becomes higher.
5. **Sharing data is tough** because each department has its own system and data files, making information exchange between parts of the organization inefficient. Information can't flow quickly, so coordination between work units gets slowed down. As a result, business processes that require data integration often get delayed.
6. **Impact on the Organization** Various weaknesses in traditional file systems make it difficult for organizations to get accurate, consistent, and timely information. Management can't get a complete picture of the organization's condition because data is scattered across different separate systems. In addition, operational costs go up due to the many files that need maintenance, increasing storage requirements, and high application development costs.

This issue shows that traditional file systems can no longer meet the needs of modern organizations that require integrated data management. Therefore, a new approach is needed through

the implementation of a Database Management System (DBMS) that can manage data centrally, reduce redundancy, improve information consistency, and support more effective decision-making. The discussion about this database management system will be explained in the next section.

4. CONCLUSION

Data management is an important factor in supporting the effectiveness of information systems and decision-making processes within an organization. Using traditional file systems comes with various limitations, such as data redundancy, information inconsistency, dependency between programs and data, low flexibility, and difficulties in sharing information across different parts of the organization. These weaknesses cause the information produced to be less accurate, less efficient, and unable to meet the growing needs of the organization. Implementing a Database Management System (DBMS) becomes a solution to address these issues through centralized data management, reduced redundancy, improved data consistency, and easier access and security of information. In addition, using relational databases, non-relational (NoSQL) databases, and good database design through normalization and Entity Relationship Diagrams (ERD) able to produce more organized data structures and support information integration within the organization.

The development of information technology also drives the use of Business Intelligence in turning data into strategically valuable information. Technologies like Data Warehouse, Data Mart, Hadoop, in-memory computing, Online Analytical Processing (OLAP), Data Mining, Text Mining, and Web Mining allow organizations to manage large amounts of data, discover patterns and trends, and produce information that is faster, more accurate, and more relevant. In this way, implementing database management and Business Intelligence technology becomes a key foundation for organizations to improve operational efficiency, support data-driven decision making, and boost competitiveness in the digital era.

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