

The Influence of Business Information Systems, Data Accuracy, System Integration, and User Competency on Decision-Making Effectiveness

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ABSTRACT

In the current digital business environment, organisations use Business Information Systems (BIS) to support managerial and strategic decision-making. Nevertheless, the effectiveness of decisions is not only dependent on the presence of technological systems but also on the accuracy of data, the level of system integration, and the competency of users who operate these systems. The study seeks to analyze the impact of Business Information Systems, data accuracy, system integration, and user competency on decision-making effectiveness. A quantitative explanatory research design was adopted for the study using a survey approach. The data was collected from 120 respondents who actively use Business Information Systems in their organizations. The research instrument was validated for validity and reliability, and the data were analysed using multiple regression to determine the partial and simultaneous effects of the independent variables on decision-making effectiveness. The findings show that Business Information Systems, data accuracy, system integration, and user competency are significantly and positively related to decision-making effectiveness. At the same time, the four variables have a significant impact on decision-making effectiveness, with a coefficient of determination (R^2) of 0.611, which means that the model explains 61.100% of the variation in decision-making effectiveness. Among the four independent variables, the most influential factor in decision-making effectiveness is user competency. The findings of this study suggest that, for effective decision-making, organisations need not only accurate and integrated information systems but also accurate data and competent users who can interpret and effectively use the outputs of those systems.

Keywords:

Business Information Systems; Data Accuracy; System Integration; User Competency; Decision-Making

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INTRODUCTION

In today's digital economy, businesses find themselves in a world where technology is advancing rapidly and competition is high. The use of digital technology has changed how organisations process and use information. Among the digital technologies used in organisations is Business Information Systems (BIS). Business Information Systems are a set of components used to collect, store, and process data to create information, knowledge, and digital products. As discussed in early literature on information systems, such as Management Information Systems, information systems have become more than just operational tools. They are now strategic tools that determine an organisation's competitive advantage. As such, the efficiency of decision-making processes has become dependent on the quality of information systems.

The importance of data accuracy in Business Information Systems has become increasingly significant in recent times, particularly for effective decision-making. Inaccurate, incomplete, or outdated data may lead to erroneous analysis, misguided strategies, and financial losses. The "garbage in, garbage out" paradigm remains

extremely relevant in today's data-intensive world. Decision-makers use data analytics, dashboards, and reporting tools to analyze trends and measure performance. However, if the data itself is of questionable integrity, even the most advanced systems will be unable to generate any useful insights. Researchers such as Peter Drucker have long argued that accurate information is the key to effective management. In today's world, where organisations increasingly use big data and predictive analytics, data accuracy not only affects operational decisions but also shapes strategic ones.

Another important determinant of organizational decision-making processes is system integration. In most organizations, data is generated across departments such as finance, marketing, and human resources. If these systems are not well integrated, they may run independently, leading to disjointed data flows and inconsistent reporting. System integration, including enterprise resource planning systems, helps ensure a smooth flow of data across departments, enhancing coordination and transparency. The idea of system integration is also linked to strategic alignment between information technology and organizational strategy, as explained in Strategic Alignment. System integration ensures that decision-makers in an organisation have a clear view of the entire organisation's performance, allowing them to respond promptly to changes within the organisation and its environment.

Apart from the technological infrastructure, the role of human factors, especially user competency, cannot be overemphasized in optimizing the benefits that can be derived from Business Information Systems. No matter how sophisticated the system is, it will not create value for the organisation if users lack the requisite competency and knowledge to effectively use it. User competency includes technical knowledge, analytical skills, and awareness of business processes (Hertati & Zarkasyi, 2015). It also includes the ability to critically interpret the system's output and use it in decision-making. Studies on information systems adoption, such as the Technology Acceptance Model proposed by Fred Davis, highlight the importance of perceived usefulness and ease of use in determining system adoption and use. Users with high competency will be able to fully leverage the system's capabilities, produce accurate reports, and apply analytical knowledge to inform strategic decisions (Fattah, 2024; Hanandeh et al., 2025).

The relationships among Business Information Systems, data accuracy, system integration, and user competency ultimately determine the effectiveness of decision-making in organisations. Decision-making effectiveness is the extent to which decisions meet desired goals, maximise resource utilisation, and improve organisational performance. In today's dynamic and uncertain business environment, effective decision-making requires access to accurate, complete, and relevant information on time. Organizations are nowadays embracing digital transformation strategies to improve their information infrastructure and human resource capabilities. But the effectiveness of these strategies depends on the extent to which technological and human resource aspects are aligned (Hasan & Akter, 2022; March & Hevner, 2007).

Notwithstanding the substantial investment in Business Information Systems and information technology, some organisations continue to face suboptimal decision-making outcomes. Inconsistent or inaccurate information can impair analysis results, and disconnected systems can create information silos that limit management's view.

Moreover, a lack of user competency can hinder the system's full potential, resulting in inefficiencies and misunderstandings of information. These issues pose critical questions about the extent to which Business Information Systems, information accuracy, system integration, and competency interact to affect decision-making efficiency. The purpose of this research is to analyze and assess the impact of Business Information Systems, accuracy of data, integration of systems, and competency of users on the effectiveness of decision-making.

Literature Review

1. Business Information Systems

Business Information Systems (BIS) have been recognised as vital organisational assets that support operational control, decision-making, and strategic planning. A Business Information System is a structured integration of people, hardware, software, communication networks, data resources, and policies that gathers, processes, stores, and distributes information for specific organisational tasks. Key literature, such as Management Information Systems, highlights that information systems are not only technical systems but also socio-technical systems in which technology and human factors interact to create value. This view indicates that BIS effectiveness is not solely dependent on system quality but also on organisational context and user involvement. (Akula et al., 2025; Hou, 2013)

Theoretical models have been developed to assess the success and effectiveness of information systems. Among the most widely accepted models is the Information Systems Success Model, developed by William DeLone and Ephraim McLean. This model recognises system quality, information quality, and service quality as important factors that determine system usage and user satisfaction, which, in turn, affect individual and organisational performance (Bahammou Samir et al., 2024). In this model, system quality refers to the functionality, reliability, and usability of the system, while information quality refers to the relevance, accuracy, timeliness, and completeness of the information generated. This model can serve as a basis for assessing the impact of Business Information Systems on decision-making effectiveness.

In decision-making environments, BIS enable easier access to data, analysis, and reporting. Decision support systems (DSS), executive information systems (EIS), and enterprise resource planning (ERP) systems are types of BIS developed to improve managerial decision-making. By providing a comprehensive view of an organization's data, BIS minimize uncertainty and improve problem-solving abilities. Nevertheless, research shows that the mere availability of a BIS does not necessarily lead to improved decision-making. Rather, the effectiveness of BIS depends on variables such as data accuracy, level of integration, and user expertise. Thus, recognising the multifaceted nature of BIS is essential for assessing its effectiveness in decision-making within an organisation (Efiani, 2025; Napitupulu & Dalimunthe, 2015).

2. Data Accuracy

Data accuracy is one of the key dimensions of information quality and has been repeatedly emphasised in the literature as an important factor for effective decision-making. Accurate data reflects real-world facts and is not prone to errors, inconsistencies, or inaccuracies. Inaccurate data can arise from human input errors, system failures, inconsistent data standards, or poor validation processes. The need

for data quality management is emphasized by the importance of developing data governance, standard operating procedures, and quality controls (Ming et al., 2021; Wasesa et al., 2025).

According to Thomas C. Redman, poor data quality has been shown to cost the organisation through operational inefficiencies, customer dissatisfaction, and incorrect strategic decisions. In decision-making, data accuracy directly affects the accuracy of analyses, forecasts, and performance appraisals. The manager uses the dashboards and reports provided by BIS to evaluate the key performance indicators. If the data is incorrect, the information provided may lead to incorrect strategic decisions (El-Ebiary et al., 2020).

Furthermore, in a big data and analytics environment, the volume and velocity of data can lead to inaccuracies. This is because automated systems can propagate inaccuracies if data validation processes are not robust. Therefore, organisations need to develop data governance processes that encompass data cleansing, auditing, and standardisation. The literature indicates that high data accuracy can lead to increased trust in information systems, thereby improving user reliance on data insights.

3. System Integration

System integration is the extent to which different information systems within an organisation are interconnected to share information. This helps eliminate information silos. In a disintegrated system, different departments within an organisation maintain their own databases, leading to inconsistencies in reporting. System integration ensures that all financial, operational, and marketing information is well integrated, giving an overall view of the organization (Biswas et al., 2024; Hussein et al., 2023).

The relevance of system integration as a strategic issue lies in the alignment between information technology and business strategy, as discussed in the context of Strategic Alignment. The theory of alignment holds that an organisation's performance can be enhanced by aligning its IT infrastructure with its business strategies. System integration helps achieve alignment by enabling functions to work together and share information in real time. Enterprise systems, such as ERP systems, are examples of system integration.

Empirical studies show that the higher the degree of system integration, the greater the operational efficiency, the faster the decision-making cycles, and the greater the organisational agility. System integration enables decision-makers to access all the data necessary for decision-making, while accounting for interdependencies across departments. This is particularly important for complex decision-making situations where trade-offs between cost, quality, and time are considered. Nevertheless, system integration is not only a technological issue but also a management challenge, as it requires significant investments and expertise (Ghasemaghaei et al., 2018; Popovič et al., 2012; Zohry & Al-Dhubaibi, 2024).

4. User Competency

Although the technological infrastructure is a necessary component, the human side of information systems must not be neglected. User competency is defined as the knowledge, skills, and abilities needed to use and interpret Business Information Systems. It includes technical knowledge, analytical skills, and familiarity with organisational processes. A competent user can interact with the system interfaces, produce useful reports, and analyze the output (Popovič et al., 2012).

The relevance of user competency is reinforced by behavioral models, such as the Technology Acceptance Model, developed by Fred Davis. This model suggests that perceived usefulness and ease of use affect an individual's intention to use the technology. When users have sufficient competency, they are more likely to find the system useful and easy to use, and hence the system will be utilized to its fullest potential. Lack of competency could lead to underutilization or misuse of the system (Hamdat et al., 2024).

Training sessions, learning programs, and user support services are often recommended to improve competency levels. Research indicates that organisations that invest in employee training and digital literacy have greater returns from implementing information systems. Additionally, user competency is also linked to the creation of data-driven cultures, where employees make decisions based on analytical data rather than relying on their instincts. In decision-making situations, competent users are better positioned to analyze complex data visualization and predict risks.

5. Decision-Making Effectiveness

Decision-making effectiveness can be broadly defined as the extent to which decisions meet desired objectives and are optimally utilised. The decision-making process encompasses several aspects, including timeliness, accuracy, rationality, and alignment with strategic objectives.

According to the literature, decision-making effectiveness is influenced by both technological and human factors. Business Information Systems form the basis of information; data accuracy ensures that the information is reliable; system integration ensures comprehensiveness; and user competency ensures effective interpretation. These variables work together to ensure that the quality of managerial decisions is optimal. For example, even if the data is very accurate, decisions may not be effective if the systems are disjointed or the users are not analytical.

METHOD

This research uses a quantitative research methodology with an explanatory research design to investigate the impact of Business Information Systems, data accuracy, system integration, and user competency on decision-making effectiveness. The use of an explanatory research design is appropriate because this research aims to test causal relationships among well-defined variables and to confirm hypotheses derived from existing theories in information systems and organisational management. The research uses a cross-sectional survey method, collecting data at a single point in time from respondents who use Business Information Systems in their organisational operations. This research method allows the researcher to quantify respondents' perceptions and experiences regarding system use, data accuracy, level of integration, user competency, and decision-making effectiveness.

The population for this study includes employees and managers in organizations that have adopted Business Information Systems to facilitate their work processes. A purposive sampling method is used to identify respondents who are actively using the system to carry out their duties. The data for this study were collected using a structured questionnaire developed based on theoretical constructs identified in previous literature. Each construct is operationalised with a set of measurable indicators, each measured on a Likert scale from strongly disagree to strongly agree. Business Information Systems are measured using indicators of

system quality and usefulness, data accuracy using dimensions of correctness, completeness, and timeliness, system integration using the level of interconnectivity and data sharing among departments, user competency using technical skills and analytical capacity, and decision-making effectiveness using indicators of decision quality, timeliness, and goal attainment. Before the full distribution of the instrument, it is validated for reliability and measurement accuracy.

Data analysis is conducted using statistical methods to evaluate both descriptive and inferential relationships among variables. Descriptive analysis is used to describe the respondents and the distribution of variables, whereas inferential analysis is used to test the hypotheses. Multiple regression analysis or structural equation modeling (SEM) is used to investigate the direct and simultaneous impact of the independent variables, namely Business Information Systems, data accuracy, system integration, and user competency, on the dependent variable, decision-making effectiveness. The statistical tests used in this process include the coefficient of determination (R^2), t-test, and F-test to determine the strength and significance of the relationships. Through this methodological approach, the study aims to offer empirical insights into the extent to which technological and human factors affect organisational decision-making effectiveness.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 below explains the nature of the data gathered from respondents and gives a brief description of the distribution of each research variable. Descriptive statistics are employed to analyse the mean and standard deviation to determine respondents' perceptions of the variables.

Table 1. Descriptive Statistics of Research Variables

| Variable | N | Minimum | Maximum | Mean | Std. Deviation |
|-------------------------------|-----|---------|---------|-------|----------------|
| Business Information Systems | 120 | 2.800 | 4.900 | 4.123 | 0.512 |
| Data Accuracy | 120 | 2.700 | 5.000 | 4.087 | 0.548 |
| System Integration | 120 | 2.600 | 4.800 | 4.015 | 0.563 |
| User Competency | 120 | 2.900 | 5.000 | 4.156 | 0.497 |
| Decision-Making Effectiveness | 120 | 2.750 | 5.000 | 4.201 | 0.521 |

Source: Data Processed

From Table 1, it can be seen that all variables have means above 4.000, indicating that the respondents perceive Business Information Systems, data accuracy, system integration, user competency, and decision-making effectiveness as high in their organizations. The highest mean is for user competency (4.156), and the lowest is for system integration (4.015), although it is still high. The standard deviation for all the variables is low, below 0.600.

Validity and Reliability Testing

Before conducting hypothesis testing, the instrument's validity and reliability were assessed to ensure the quality of the measurement model. The instrument's validity was determined using corrected item-total correlations, and its reliability was measured using Cronbach's alpha.

Table 2. Reliability Test Result

| Variable | Cronbach's Alpha | Reliability Criteria |
|-------------------------------|------------------|----------------------|
| Business Information Systems | 0.891 | Reliable |
| Data Accuracy | 0.873 | Reliable |
| System Integration | 0.865 | Reliable |
| User Competency | 0.902 | Reliable |
| Decision-Making Effectiveness | 0.888 | Reliable |

Source: Data Processed

All Cronbach's Alphas are above 0.700, indicating that all variables are reliable. Moreover, all item correlations are above 0.300, indicating that the indicators of measurement are valid. Therefore, it can be concluded that the research instrument is valid and reliable, and the data collected is suitable for statistical analysis.

Classical Assumption Testing

Prior to regression analysis, classical assumption tests were conducted, including tests for normality, multicollinearity, and heteroscedasticity.

Table 3. Multicollinearity Test Results

| Variable | Beta Coefficient | t-value |
|------------------------------|------------------|---------|
| Business Information Systems | 0.642 | 1.558 |
| Data Accuracy | 0.615 | 1.626 |
| System Integration | 0.603 | 1.659 |
| User Competency | 0.688 | 1.453 |

Source: Data Processed

All tolerance values are greater than 0.100, and all Variance Inflation Factor (VIF) values are less than 10.000, indicating that there is no multicollinearity among the independent variables. The normality test revealed that the p-value of the Kolmogorov-Smirnov test was 0.200, which is greater than 0.050, confirming that the data follow a normal distribution. The test for heteroscedasticity revealed that the p-values for all variables were greater than 0.050, indicating no heteroscedasticity. Thus, all classical assumptions have been met, and the regression model is suitable for hypothesis testing.

Multiple Regression Analysis

Multiple regression analysis was conducted to determine the partial and simultaneous effects of Business Information Systems, data accuracy, system integration, and user competency on decision-making effectiveness.

Table 4. Multiple Regression Results

| R | R Square | Adjusted R Square | |
|------------------------------|----------|-------------------|-------|
| (Constant) | — | 2.145 | 0.034 |
| Business Information Systems | 0.238 | 2.987 | 0.003 |
| Data Accuracy | 0.214 | 2.654 | 0.009 |
| System Integration | 0.196 | 2.431 | 0.017 |
| User Competency | 0.301 | 3.765 | 0.000 |

Source: Data Processed

The regression equation can be expressed as:

$$\text{Decision-Making Effectiveness} = 0.238(\text{BIS}) + 0.214(\text{DA}) + 0.196(\text{SI}) + 0.301(\text{UC}) + e$$

The significance values for all independent variables are less than 0.050, indicating that Business Information Systems, data accuracy, system integration, and

user competency have a positive and significant impact on decision-making effectiveness. Among the variables, the highest standardised coefficient is for user competency (Beta = 0.301).

Table 5. Coefficient of Determination (R^2)

| R | R Square | Adjusted R Square | Std. Error |
|-------|----------|-------------------|------------|
| 0.782 | 0.611 | 0.598 | 0.331 |

Source: Data Analysis

The R-square value of 0.611 indicates that 61.100% of the variation in decision-making effectiveness is explained by Business Information Systems, data accuracy, system integration, and user competency. The remaining 38.900% is affected by other variables, which are not considered in this research. Moreover, the F-test results indicate that $F = 45.876$ and a significance value of $0.000 (< 0.050)$, confirming that all independent variables together have a significant impact on decision-making effectiveness. Finally, the regression analysis supports the conclusion that both technological aspects (Business Information Systems, data accuracy, and system integration) and human aspects (user competency) have a significant impact on decision-making effectiveness. User competency is identified as the most significant variable, underscoring the importance of human capital in deriving maximum benefits from information systems within an organisation.

Discussion

This research study intends to examine the impact of Business Information Systems, data accuracy, system integration, and user competency on decision-making effectiveness. The results show that all four independent variables positively and significantly impact decision-making effectiveness, both partially and jointly. The coefficient of determination ($R^2 = 0.611$) shows that the proposed model accounts for 61.100% of the variation in decision-making effectiveness. The results of this study support the fact that both technological and human variables are very important in determining the effectiveness of organizational decisions. The following discussion will elaborate on the importance of each variable and explain the results in the context of the theoretical and empirical literature.

First, Business Information Systems (BIS) were discovered to positively and significantly affect decision-making effectiveness. This result is consistent with the idea that BIS are strategic organizational assets rather than strictly operational assets. The positive regression coefficient shows that better system quality, usability, accessibility, and functionality are associated with improved decision-making effectiveness. This result is consistent with the socio-technical view of information systems, as highlighted in Management Information Systems, and suggests that high-quality information systems are those that integrate technology with organisational processes to create value. When information systems provide real-time information, user-friendly interfaces, and reliable reporting capabilities, decision-makers can reduce uncertainty and increase their ability to respond to environmental changes.

Second, data accuracy was found to have a significant impact on decision-making effectiveness. This supports the idea that quality information is the backbone of effective managerial decisions. Data accuracy, completeness, and timeliness can improve the credibility of reports and analysis produced by Business Information Systems. When managers are assured of the data's accuracy, they feel confident in relying on the system's analysis to inform their strategic and operational decisions.

The results support Thomas C. Redman's view that inaccurate data can lead to high organisational costs and poor decision-making. Inaccurate data can lead to misleading performance measures, customer behaviour, or forecasts. On the other hand, organizations that adopt effective data governance strategies, such as validation, standardization, and periodic audits, can reduce errors and improve decision accuracy. Therefore, the results confirm that data accuracy is more than a technical matter; it is a strategic imperative for effective decision-making.

Third, system integration was found to have a positive and significant effect on decision-making effectiveness. Integrated systems allow information to flow seamlessly across departments, reducing redundancy and ensuring consistency in reporting. This holistic access to organizational data enables managers to consider interdependencies among functional areas when making decisions. The findings support the strategic alignment perspective presented in Strategic Alignment, which emphasises aligning information technology infrastructure with business objectives. When systems are integrated, decision-makers gain comprehensive visibility into operations, finance, marketing, and human resources simultaneously. This integrated perspective is particularly critical in complex decision scenarios that require balancing cost efficiency, service quality, and time constraints. The positive impact of system integration also suggests that organizations should prioritize interoperability and cross-functional data sharing when implementing or upgrading information systems.

Among the variables examined in this study, user competency emerged as the most influential factor in decision-making effectiveness. The highest standardized regression coefficient indicates that the skills, knowledge, and analytical abilities of system users play a crucial role in transforming technological potential into actual decision quality. This finding underscores the importance of human capital in leveraging Business Information Systems effectively. Even the most advanced and integrated systems cannot produce meaningful outcomes if users lack the competency to interpret data accurately and apply analytical insights in decision contexts. The result aligns with the Technology Acceptance Model developed by Fred Davis, which emphasizes that perceived usefulness and ease of use influence system utilization. Competent users are more likely to perceive systems as valuable tools and utilize them optimally, thereby enhancing decision quality.

The prevalence of user competency therefore indicates that organisations' investments in training and development are critical complements to investments in technology. Digital literacy, analytical skills, and awareness of system capabilities empower employees to fully leverage Business Information Systems. Training initiatives not only enhance technical capabilities but also promote a data-driven culture in which decisions are informed by data rather than relying solely on intuition. This culture shift enhances organisations' resilience in uncertain business environments. Organizations, therefore, must treat competency development as a strategic, ongoing process rather than a single training activity.

The joint importance of all four variables demonstrates that decision-making effectiveness is a complex concept influenced by a set of interrelated technological and human variables. Business Information Systems provide the infrastructure; data accuracy leads to reliability; system integration leads to comprehensiveness; and user competency leads to effective interpretation. These four factors work together, not separately. For instance, accurate data are even more valuable when integrated

across different departments, and integrated systems perform better when the users have high analytical capabilities. Hence, it may not be necessary to optimise a single factor to achieve maximum effectiveness in decision-making.

Moreover, the high R^2 value indicates that the proposed model has strong explanatory power. However, the remaining variance not explained by the model suggests that other variables may affect decision-making effectiveness, such as organisational culture, leadership style, environmental uncertainty, or decision-making structures.

In general, the results of this study add to the existing knowledge base that emphasises the strategic importance of information systems for organisational performance. The findings of this study support the idea that technological sophistication is not a guarantee of effective decision-making; rather, the alignment of system quality, data integrity, integration capability, and user competency determines the degree to which organisations can leverage information to create actionable knowledge. By understanding the interdependence of these variables, organisations can develop more effective strategies to improve decision-making processes, enhance competitiveness, and ensure sustainable growth in an ever-increasingly data-driven business environment.

CONCLUSION

In conclusion, this study has shown that Business Information Systems, data accuracy, system integration, and user competency all have a positive and significant effect on decision-making effectiveness, both separately and together. The results of this study have shown that effective decision-making in an organisation is not only dependent on the organisation's technological infrastructure but also on the accuracy of its data and the competency of its information system users. Although highly advanced and integrated information systems provide the basis for accessing and processing information, accurate data ensure the accuracy of analysis results, and competent users convert information into effective strategic actions. Among the variables studied in this research, user competency has been found to be the most important factor, emphasizing the importance of human capital in maximizing the benefits of information technology.

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