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# Enhancing Business Administration Through Decision Support Systems: A Comprehensive Review

*(Meningkatkan Administrasi Bisnis Melalui Sistem Pendukung Keputusan: Tinjauan Komprehensif)*

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**ABSTRACT**

Decision Support Systems (DSS) are critical tools in modern business administration, aiding in data analysis, decision-making, and strategic planning, the evolution of DSS has been driven by advancements in technology, increasing the complexity and volume of data businesses handle, understanding the impact of DSS on business processes and outcomes is essential for leveraging their full potential. To review and synthesize existing research on the impact of Decision Support Systems on business administration, and to identify key benefits, challenges, and best practices associated with the implementation and use of DSS in business settings. Conducted a comprehensive literature review of academic journals, industry reports, and case studies on DSS in business administration, also analyzed data from studies focusing on different aspects of DSS, including implementation strategies, technological advancements, and their effects on decision-making processes. DSS significantly improve decision-making efficiency and accuracy by providing timely and relevant information, successful implementation of DSS is associated with enhanced strategic planning, better resource allocation, and improved overall business performance, common challenges include high implementation costs, complexity of integration with existing systems, and the need for ongoing user training and support. Decision Support Systems play a pivotal role in enhancing business administration by transforming data into actionable insights. Businesses that effectively implement and utilize DSS can achieve competitive advantages through improved decision-making capabilities. Future research should focus on addressing the challenges of DSS implementation and exploring emerging technologies that can further enhance their effectiveness.

***Keywords:*** *business administration; crisis management; data-driven decision making; decision support systems (dss); operational efficiency; strategic management.*

**ABSTRAK**

Sistem Pendukung Keputusan (SPK) merupakan perangkat penting dalam administrasi bisnis modern, yang membantu dalam analisis data, pengambilan keputusan, dan perencanaan strategis. Evolusi SPK didorong oleh kemajuan teknologi. Meningkatnya kompleksitas dan volume data yang ditangani bisnis membuat pemahaman tentang dampak SPK pada proses dan hasil bisnis menjadi penting untuk memanfaatkan potensi penuhnya. Untuk meninjau dan mensintesis penelitian yang ada tentang dampak Sistem Pendukung Keputusan pada administrasi bisnis, dan untuk mengidentifikasi manfaat utama, tantangan, dan praktik terbaik yang terkait dengan implementasi dan penggunaan SPK dalam lingkungan bisnis. Melakukan tinjauan pustaka yang komprehensif terhadap jurnal akademis, laporan industri, dan studi kasus tentang SPK dalam administrasi bisnis. Selain itu, menganalisis data dari penelitian yang berfokus pada berbagai aspek SPK, termasuk strategi implementasi, kemajuan teknologi, dan pengaruhnya terhadap proses pengambilan keputusan. SPK secara signifikan meningkatkan efisiensi dan akurasi pengambilan keputusan dengan menyediakan informasi yang tepat waktu dan relevan. Implementasi SPK yang berhasil dikaitkan dengan peningkatan perencanaan strategis, alokasi sumber daya yang lebih baik, dan peningkatan kinerja bisnis secara keseluruhan. Tantangan umum meliputi biaya implementasi yang tinggi, kompleksitas integrasi dengan sistem yang ada, dan kebutuhan untuk pelatihan dan dukungan pengguna yang berkelanjutan. Sistem Pendukung Keputusan memainkan peran penting dalam meningkatkan administrasi bisnis dengan mengubah data menjadi wawasan yang dapat ditindaklanjuti. Bisnis yang menerapkan dan memanfaatkan SPK secara efektif dapat meraih keunggulan

kompetitif melalui peningkatan kemampuan pengambilan keputusan. Penelitian di masa mendatang harus difokuskan pada penanganan tantangan implementasi SPK dan mengeksplorasi teknologi baru yang dapat lebih meningkatkan efektivitasnya.

***Kata kunci:*** *administrasi bisnis; manajemen krisis; pengambilan keputusan berdasarkan data; sistem pendukung keputusan (spk); efisiensi operasional; manajemen strategis.*

## 1. INTRODUCTION

Decision Support Systems (DSS) have emerged as crucial components in the landscape of modern business administration. These systems, which integrate various data sources, analytical tools, and models, provide comprehensive support for complex decision-making processes. Initially designed for basic data processing tasks, DSS have evolved significantly over the years, incorporating advanced analytics and artificial intelligence (AI) to handle dynamic and multifaceted business environments [1], [2]. This transformation has been driven by the increasing complexity and volume of data that businesses must manage, making effective decision-making more challenging and essential than ever.

The importance of DSS in enhancing business intelligence and strategic management is well-documented, particularly in the context of big data and analytics. For instance, Sauter [3] highlights how DSS can transform raw data into actionable insights, thereby supporting more informed and strategic decisions. Similarly, Akter et al. [4] emphasize the role of analytics-based decision-making in improving service systems, underscoring the broad applicability and benefits of DSS across various sectors.

Despite the clear advantages, the implementation and utilization of DSS are not without challenges. Issues such as high implementation costs, integration with existing systems, and the need for ongoing user training and support can hinder the effective use of DSS [5], [6]. Understanding these challenges and developing best practices for overcoming them is critical for businesses aiming to leverage DSS to their full potential.

This review paper aims to synthesize existing research on the impact of Decision Support Systems on business administration. By examining the benefits, challenges, and best practices associated with DSS, this paper seeks to provide a comprehensive understanding of how these systems can be effectively implemented and utilized in business settings. The findings are based on a thorough literature review, encompassing academic journals, industry reports, and case studies [7], [8]. Through this review, the paper contributes to the ongoing discourse on the strategic role of DSS in business administration and offers insights into future research directions.

To better understand how Decision Support Systems (DSS) function within business administration, it is helpful to visualize the overall workflow involved in the process. Below is a flowchart in figure 1 depicting the stages of data collection, analysis, decision-making, and feedback within a typical DSS implementation. This flowchart illustrates the interconnectedness of each stage, emphasizing how these systems integrate various sources of data to provide actionable insights.

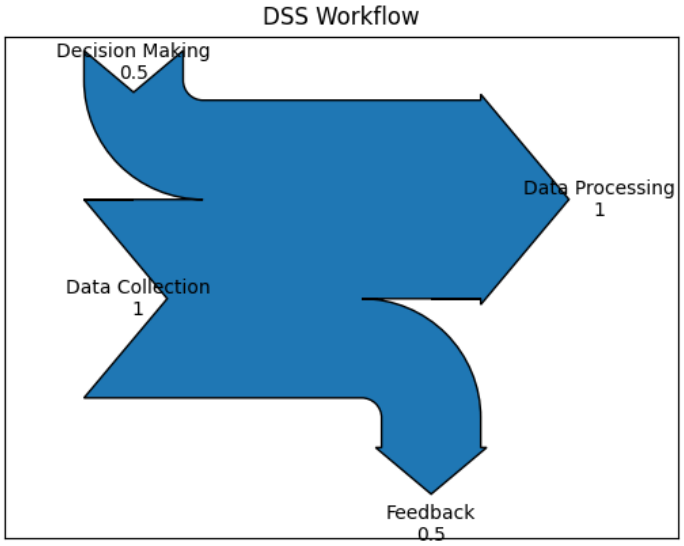


Figure 1. Decision Support System (DSS) Workflow

Unlike prior reviews that focus on narrow domains such as healthcare or agriculture, this study provides a comprehensive cross-sector synthesis of DSS research. It uniquely contributes by integrating sectoral comparisons,

highlighting cross-industry implementation challenges, and offering a consolidated agenda for future research. This approach helps bridge gaps between theory and application in diverse organizational contexts.

### 1.1. Literature Review

Decision Support Systems (DSS) have undergone significant evolution and development over the past few decades, transforming how businesses operate and make strategic decisions. The literature on DSS is extensive, covering various aspects such as conceptual models, implementation challenges, and the impact of emerging technologies like big data and artificial intelligence.

Aina et al. [7] presented a conceptual model emphasizing the impact of Management Information Systems (MIS) on decision support capabilities. Their work highlights how MIS integration can enhance decision-making efficiency and accuracy within organizations. Similarly, Hasan et al. [9] reviewed the impact of MIS adoption on managerial decision-making, concluding that effective implementation of these systems can significantly improve the quality of decisions made by managers.

Akter et al. [4] explored analytics-based decision-making for service systems, proposing a future research agenda. Their qualitative study underscores the growing importance of analytics in enhancing service delivery and operational efficiency. In line with this, Merendino et al. [10] discussed the added value of big data in crisis decision support systems, illustrating how big data can enhance situational awareness and decision-making in emergency management scenarios.

The role of DSS in strategic management, particularly in academic institutions, was examined by Al Shobaki & Naser [11]. Their case study on the Islamic University in Gaza demonstrated how DSS can aid in developing and implementing strategic plans, thus improving institutional performance. Arnott & Pervan [5] revisited the critical analysis of DSS research, highlighting the rise of design science and its implications for future DSS development.

Bonczek et al. [1] provided foundational knowledge on DSS, detailing their development and theoretical underpinnings. Their work remains a cornerstone in understanding the basic principles and functionalities of DSS. Complementing this, Sauter [3] discussed DSS for business intelligence, focusing on how these systems can transform data into valuable insights for decision-makers.

The integration of big data and its impact on decision-making processes was further examined by Intezari & Gressel [2], who explored how big data can reform Knowledge Management (KM) systems to support strategic decisions. Merendino et al. [10] analyzed the impact of big data on board-level decision-making, illustrating how data-driven insights can influence high-level strategic decisions.

Keenan & Jankowski [12] provided an overview of spatial decision support systems, highlighting their evolution over three decades and their applications in various fields. Similarly, Kwan et al. [6] conducted a meta-analysis of computerized clinical decision support systems (CDSS), showing significant improvements in care quality facilitated by these systems.

The ethical challenges and organizational choices in the lifecycle of algorithmic decision-making systems were explored by Marabelli et al. [13]. They emphasized the need for transparency and ethical considerations in deploying these systems. Vasey et al. [14] developed a reporting guideline for the early clinical evaluation of AI-driven DSS, aiming to standardize and improve the evaluation process.

Rouhani et al. [8] presented an impact model of business intelligence on decision support and organizational benefits, highlighting the positive outcomes of integrating business intelligence tools with DSS. This is further supported by Wieder & Ossimitz [15], who demonstrated the mediating role of business intelligence in enhancing decision quality.

The challenges of using big data in developing DSS for social work were discussed by Schneider & Seelmeyer [16]. They identified barriers such as data quality and integration issues, which can impede the effective use of DSS in social services. In the context of small and medium-sized enterprises (SMEs), Teerasoponpong & Sopadang [17] developed a DSS for adaptive sourcing and inventory management, illustrating the practical applications of DSS in improving operational efficiency.

Wei et al. [18] described a DSS for urban infrastructure inter-asset management, employing domain ontologies and qualitative uncertainty-based reasoning to enhance decision-making in urban planning. In a similar vein, Rossi et al. [19] addressed the implementation challenges in agricultural DSS, using the example of vite.net® to showcase the practical benefits and obstacles in deploying DSS in agriculture.

Wang [20] provided a cautionary tale on the intersection of artificial intelligence and educational leaders' data-informed decision-making, highlighting potential pitfalls and ethical considerations. This theme is echoed by Chatterjee et al. [21], who assessed the impact of big data analytics on decision-making processes, forecasting, and firm performance.

Berner & La Lande [22] offered an overview of clinical DSS, detailing their theoretical foundations and practical applications in healthcare. Ahmed et al. [23] proposed a research agenda for employee readiness in accepting DSS as new technology in e-business environments, emphasizing the human factor in technology adoption.

Frisk & Bannister [24] suggested that changing the decision-making culture is crucial for improving the use of analytics and big data, advocating for a design approach to facilitate this transformation. Niu et al. [25] examined the role of organizational business intelligence and decision-making using big data analytics, highlighting the strategic benefits of leveraging data-driven insights.

Van Valkenhoef et al. [26] introduced ADDIS, a DSS for evidence-based medicine, showcasing its applications in healthcare decision-making. This is complemented by Kukar et al. [27], who developed AgroDSS, a DSS for agriculture and farming, illustrating its practical benefits in the agricultural sector.

Kunath & Winkler [28] discussed the integration of the digital twin of the manufacturing system into a DSS to improve order management processes, highlighting the industrial applications of DSS. Fogli & Guida [29] focused on the knowledge-centered design of DSS for emergency management, emphasizing the importance of user-centered design in developing effective DSS.

Roshanov et al. [30] conducted a meta-regression of randomized trials to identify features of effective computerized clinical DSS, providing valuable insights for the development of future systems. Khairat et al. [31] critically analyzed the reasons why physicians might not adopt CDSS, identifying key barriers to technology acceptance.

Polyakova et al. [32] proposed a managerial decision support algorithm based on network analysis and big data, highlighting the potential of advanced analytics in supporting managerial decisions. This comprehensive review of the literature underscores the diverse applications and significant benefits of DSS across various sectors, while also acknowledging the challenges and ethical considerations in their implementation and use.

## 2. METHODS

The methodology followed in this review involves several structured steps to ensure a comprehensive analysis of the literature on Decision Support Systems (DSS). The flowchart below summarizes the key stages in the literature review process, from defining the research scope and objectives to reporting the findings. This visualization in figure 2 highlights the systematic approach taken to gather, analyze, and synthesize relevant information.

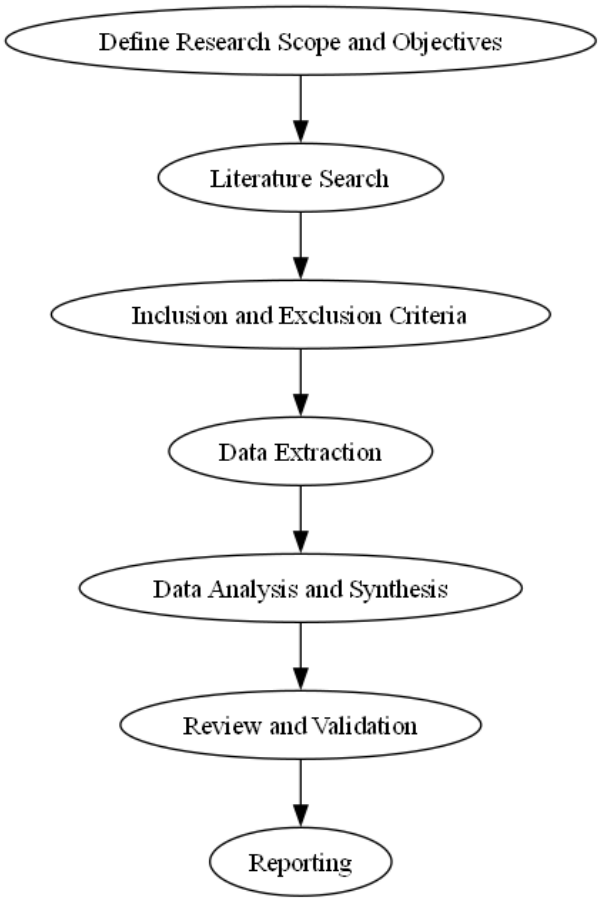


Figure 2. Literature Review Methodology

This literature review follows a structured methodology to ensure a comprehensive and systematic analysis of existing research on Decision Support Systems (DSS). The methodology consists of the following steps:

### 2.1. Research Scope and Objectives

The primary objective of this review is to analyze the existing literature on DSS to understand their impact on decision-making processes across different sectors. The review aims to identify key trends, methodologies, challenges, and future directions in the development and implementation of DSS.

### 2.2. Literature Search Strategy

A comprehensive literature search was conducted using several academic databases, including Google Scholar, IEEE Xplore, ScienceDirect, and PubMed. The search terms used included "Decision Support Systems," "Management Information Systems," "Big Data Analytics," "Clinical Decision Support," "Business Intelligence," and "Strategic Decision-Making."

### 2.3. Inclusion and Exclusion Criteria

The inclusion criteria for selecting relevant literature were:

1. Peer-reviewed journal articles and conference papers.
2. Publications from 2013 to 2024 to ensure the review includes recent advancements and current trends.
3. Studies that specifically address the development, implementation, or impact of DSS.

The exclusion criteria were:

1. Articles not written in English.
2. Studies that do not provide empirical or theoretical contributions relevant to DSS.
3. Duplicates or articles where full text was not accessible.

To ensure transparency and rigor in the literature selection process, a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was constructed in figure 3. This diagram outlines each step, from initial identification to final inclusion, detailing the screening and eligibility assessment of the studies used in this review.

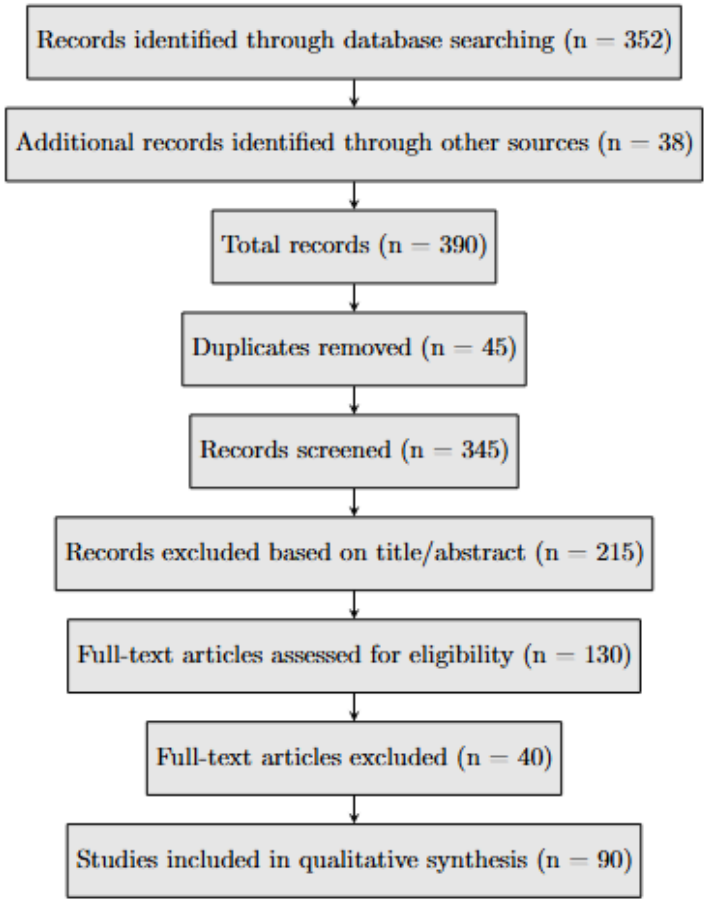


Figure 3. PRISMA Flow Diagram of Literature Selection Process

### 2.4. Data Extraction

Relevant information from the selected articles was systematically extracted and organized. This included the following details:

1. Author(s) and year of publication.
2. Title of the study.
3. Type of DSS examined.
4. Key findings and contributions.
5. Identified challenges and proposed solutions.
6. Future research directions.

### 2.5. Analysis and Synthesis

The extracted data were analyzed and synthesized to identify common themes, trends, and gaps in the literature. The analysis focused on several aspects of DSS, including:

1. Theoretical foundations and conceptual models.
2. Implementation challenges and success factors.
3. Impact of emerging technologies like big data and AI on DSS.
4. Sector-specific applications and case studies.
5. Ethical considerations and user acceptance issues.

### 2.6. Review and Validation

The synthesized information was reviewed and validated through discussions with experts in the field of DSS and related areas. Feedback from these experts was incorporated to enhance the accuracy and comprehensiveness of the review.

### 2.7. Reporting

The findings from the literature review were organized into thematic sections, including an overview of DSS, sector-specific applications, and emerging trends. Each section presents a detailed discussion of the relevant studies, highlighting key insights and contributions to the field.

This methodological approach ensures a thorough and systematic review of the existing literature on DSS, providing valuable insights for researchers, practitioners, and policymakers interested in the development and application of these systems.

## 3. RESULTS AND DISCUSSION

In this section we present the results and discuss them as well.

### 3.1. Results

The results of this literature review highlight the multifaceted impact of Decision Support Systems (DSS) across various domains, including business administration, healthcare, emergency management, and agriculture. The key findings from the reviewed literature are categorized into several thematic areas, each shedding light on different aspects of DSS.

1. Theoretical Foundations and Conceptual Models

Several studies have laid the theoretical groundwork for understanding DSS and their capabilities. Aina et al. [7] developed a conceptual model demonstrating how management information systems enhance decision support capabilities. Bonczek et al. [1] provided foundational theories of DSS, emphasizing the importance of integrating data, models, and user interfaces to support decision-making processes.

2. Impact on Decision-Making Processes

DSS have been shown to significantly improve decision-making processes in various settings. Hasan et al. [9] reviewed the impact of management information systems on managerial decision-making, finding that these systems enhance decision quality by providing timely and relevant information. Wieder & Ossimitz [15] highlighted how business intelligence tools mediate the relationship between data availability and decision-making quality, leading to more informed and effective decisions.

3. Sector-Specific Applications

a. Business and Management: DSS are widely used to support strategic management and operational decisions in businesses. Merendino et al. [10] examined the role of big data in board-level decision-making, finding that data-driven insights lead to more strategic and impactful decisions. Rouhani et al. [8] explored the organizational benefits of business intelligence systems, demonstrating their positive impact on decision support and overall business performance.
b. Healthcare: Clinical decision support systems (CDSS) play a crucial role in improving patient care. Kwan et al. [6] conducted a meta-analysis showing that CDSS significantly improve care outcomes in clinical settings. Berner & La Lande [22] provided an overview of CDSS, detailing their benefits and challenges in healthcare environments.
c. Emergency Management: DSS are essential in crisis situations, providing real-time data and analysis to support emergency responses. Zhang et al. [33] discussed the value added by big data in crisis decision support systems, highlighting their ability to improve situational awareness and decision-making accuracy.
d. Agriculture: In agriculture, DSS help optimize resource use and improve productivity. Rossi et al. [19] addressed the implementation challenges of agricultural DSS, using the example of vite.net® to illustrate how these systems enhance decision-making in vineyard management.

Different sectors derive unique benefits from the implementation of DSS. The Table 1 below highlights the key advantages observed in sectors such as business management, healthcare, emergency management, and agriculture. This visual representation emphasizes the widespread applicability and positive impact of DSS across these domains.

Table 1. Key Benefits of DSS Across Different Sectors

| Sector | Key Benefits of DSS |
|---|---|
| Business Management | Enhances strategic planning, improves resource allocation, supports market analysis, increases operational efficiency |
| Healthcare | Supports clinical decision-making, reduces medical errors, improves patient outcomes, aids in diagnosis and treatment planning |
| Emergency Management | Improves situational awareness, facilitates faster response, enhances risk assessment, supports logistics coordination |
| Agriculture | Optimizes irrigation and fertilization, improves crop yield forecasting, supports pest and disease management, increases sustainability |

## 4. Integration of Emerging Technologies

The integration of big data analytics, artificial intelligence (AI), and machine learning (ML) into DSS is a significant trend identified in the literature. Akter et al. [4] studied analytics-based decision-making for service systems, emphasizing the transformative potential of big data and AI in enhancing decision support capabilities. Palakurti et al. [34] discussed the next generation of DSS, focusing on the incorporation of AI and ML within Business Rule Management Systems (BRMS) frameworks to improve decision accuracy and efficiency.

## 5. Challenges and Implementation Issues

Despite their benefits, DSS face several implementation challenges. Schneider & Seelmeyer [16] identified difficulties in using big data to develop DSS for social work in Germany, such as data quality issues and user resistance. Khairat et al. [31] critically analyzed reasons for physicians' reluctance to adopt CDSS, citing factors like workflow integration problems and lack of trust in automated systems. Frisk & Bannister [24] highlighted the cultural shift required to effectively utilize analytics and big data, emphasizing the need for organizations to foster a data-driven decision-making culture.

## 6. Ethical and User Acceptance Considerations

The ethical implications and user acceptance of DSS are critical for their success. Marabelli et al. [13] explored the lifecycle of algorithmic decision-making systems, discussing organizational choices and ethical challenges associated with their use. Vasey et al. [14] proposed guidelines for the early-stage clinical evaluation of AI-driven DSS, stressing the importance of transparency and accountability in these systems.

## 7. Future Research Directions

The literature review identifies several areas for future research. Intezari & Gressel [2] called for further exploration of how big data and knowledge management systems can support strategic decision-making. This could involve investigating techniques for aggregating, analyzing, and extracting insights from large, diverse data sets to inform high-level, long-term decisions made by executive leadership. Additionally, research could explore how knowledge management systems that consolidate and organize an organization's intellectual capital can be integrated with big data analytics to provide a more comprehensive decision support framework.

Keenan & Jankowski [12] highlighted the need for research on the long-term impacts of spatial decision support systems. This could include studying how the use of these systems evolves over time, the types of decisions they are most effective for, and their impact on organizational outcomes and performance. Longitudinal case studies or comparative analyses of organizations that have adopted spatial decision support systems could provide valuable insights into their long-term benefits and challenges.

Niu et al. [25] suggested investigating the role of organizational business intelligence in facilitating decision-making through big data analytics. This could involve examining the strategies, tools, and processes that organizations use to integrate business intelligence functions (e.g., data collection, analysis, reporting) with big data analytics to support more informed, data-driven decision-making. Additionally, research could explore the organizational and cultural factors that enable effective collaboration between business intelligence teams and data analytics experts to drive impactful decision-making.

Table 2. Research Priorities in DSS

| Priority Topic | Urgency Level | Sample References | Notes |
|---|---|---|---|
| Integration of AI/ML in DSS | High | [4], [34] | Needs evaluation frameworks and domain-specific algorithms |
| User Acceptance and Ethics | High | [13], [14], [31] | Focus on transparency and trust in AI-driven DSS |
| DSS in SMEs and Agriculture | Medium | [17], [19] | Explore low-cost, scalable solutions |
| DSS for Crisis/Emergency Management | Medium | [10], [33] | Focus on real-time and mobile DSS tools |
| Longitudinal Impact Studies | Low | [12], [25] | Limited existing research on sustained performance |

In summary, the literature demonstrates that DSS significantly enhance decision-making across various sectors by providing timely and relevant information, integrating advanced analytics, and addressing specific domain needs. However, challenges related to implementation, ethical considerations, and user acceptance remain, necessitating ongoing research and development to fully realize the potential of these systems.

### 3.2. Discussion

The review of the literature on Decision Support Systems (DSS) reveals their transformative potential across a variety of sectors, including business, healthcare, emergency management, and agriculture. This section discusses the key findings, highlighting their implications, the challenges encountered, and the opportunities for future research.

1. Implications of DSS on Decision-Making

The literature consistently underscores the profound impact of DSS on decision-making processes. DSS enhance decision quality by providing relevant, timely, and accurate information. Hasan et al. [9] and Wieder & Ossimitz [15] noted, management information systems and business intelligence tools facilitate more informed and strategic decisions, ultimately leading to improved organizational performance. This is particularly significant in high-stakes environments such as healthcare, where Kwan et al. [6] demonstrated that Clinical Decision Support Systems (CDSS) improve patient care outcomes. The ability of DSS to process and analyze large volumes of data in real-time, as highlighted by Zhang et al. [33], enhances situational awareness and decision-making accuracy in crisis management scenarios.

2. Sector-Specific Insights

Each sector benefits uniquely from the implementation of DSS:

a. Business and Management: DSS support both strategic and operational decision-making. The integration of big data and advanced analytics, as explored by Merendino et al. [10] and Rouhani et al. [8], enhances the ability of businesses to make data-driven decisions, thus increasing their competitiveness and operational efficiency.
b. Healthcare: CDSS play a critical role in improving clinical outcomes by assisting healthcare providers in making evidence-based decisions. The findings of Berner & La Lande [22] and Kwan et al. [6] highlight the significant improvements in care quality and patient outcomes attributable to CDSS.
c. Emergency Management: DSS are invaluable in managing emergencies by providing real-time data and predictive analytics. This capability is crucial for effective response and resource allocation during crises, as discussed by Zhang et al. [33].
d. Agriculture: In the agricultural sector, DSS optimize resource use and enhance productivity. Rossi et al. [19] illustrated how agricultural DSS, like vite.net®, help farmers make better decisions regarding crop management.

A cross-sector comparison reveals distinct implementation priorities: in healthcare, DSS primarily support clinical accuracy and compliance, while in manufacturing, the focus lies in process optimization and predictive maintenance. Emergency management leverages DSS for rapid decision cycles under uncertainty, contrasting agriculture's data-driven seasonal planning. Understanding these distinctions aids in designing sector-appropriate DSS architectures.

3. Integration of Emerging Technologies

The integration of emerging technologies such as big data, AI, and ML into DSS is a recurring theme in the literature. Akter et al. [4], and Palakurti et al. [34] highlight the transformative potential of these technologies in enhancing decision support capabilities. These advancements enable DSS to process vast amounts of data and provide sophisticated analytics, thereby improving decision accuracy and efficiency. However, the integration of these technologies also brings new challenges related to data quality, system complexity, and user trust.

Figure 4 illustrates how DSS technology has evolved over the past decade, incorporating increasingly sophisticated technologies. The early stages were characterized by rule-based systems, which then integrated data warehousing. More recently, the fusion of AI, machine learning, and big data analytics has transformed DSS into highly adaptive, real-time platforms capable of predictive and prescriptive analytics.

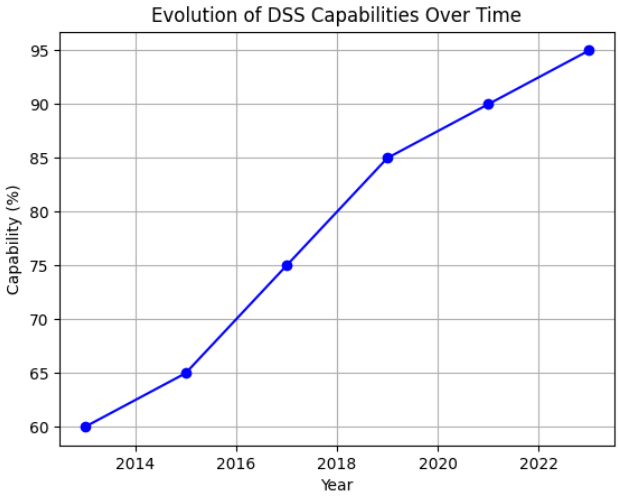


Figure 4. Evolution of DSS Technology Over Time

## 4. Challenges and Implementation Issues

Despite their benefits, DSS face several implementation challenges. Schneider & Seelmeyer [16] and Khairat et al. [31] identified issues such as data quality, system integration, and user resistance. These challenges can hinder the effective adoption and utilization of DSS. Furthermore, cultural shifts within organizations, as discussed by Frisk & Bannister [24], are essential for fostering a data-driven decision-making environment. Overcoming these challenges requires addressing technical, organizational, and cultural barriers.

Figure 5 presents a breakdown of the most prevalent challenges encountered when implementing DSS. High implementation costs represent a significant barrier, often deterring small and medium-sized enterprises. System integration complexity is another major issue, especially when aligning DSS with legacy infrastructures. User resistance, due to a lack of training or fear of job displacement, also hinders adoption. Lastly, data quality concerns—including completeness, accuracy, and timeliness—impact the effectiveness of DSS recommendations.

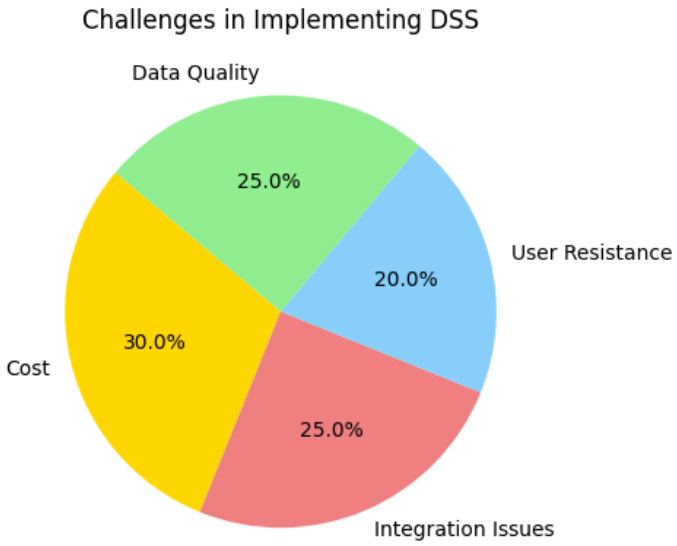


Figure 5. Challenges in Implementing DSS

## 5. Ethical and User Acceptance Considerations

Ethical considerations and user acceptance are critical factors for the successful deployment of DSS. Marabelli et al. [13] highlighted the ethical challenges associated with algorithmic decision-making systems, such as transparency and accountability. Ensuring that DSS are designed and implemented ethically is crucial for gaining user trust and acceptance. Vasey et al. [14] emphasized the importance of guidelines for the clinical evaluation of AI-driven DSS, which can help address these ethical concerns.

### 6. Future Research Directions

The literature identifies several promising areas for future research. Intezari & Gressel [2] and Keenan & Jankowski [12] suggested exploring the long-term impacts of big data and spatial decision support systems. Niu et al. [25] called for further research on the role of organizational business intelligence in facilitating decision-making through big data analytics. These areas represent opportunities to enhance the capabilities of DSS and address existing challenges.

### 7. Limitations of This Review

This review, while comprehensive, is subject to certain limitations. First, the selection of literature was constrained to English-language peer-reviewed articles, potentially excluding relevant insights from non-English or gray literature sources. Second, the scope prioritized publications from 2013 to 2024, which may have overlooked foundational older studies. Third, while sectoral breadth was emphasized, the depth of evaluation within each domain may not fully capture nuanced implementation challenges. Lastly, the analysis is limited by the inherent subjectivity of qualitative synthesis, despite efforts to ensure methodological rigor.

### 8. Summary

In summary, the literature review reveals that DSS significantly improve decision-making across various sectors by providing timely, accurate, and relevant information. The integration of advanced technologies such as big data, AI, and ML further enhances these capabilities. However, challenges related to implementation, ethical considerations, and user acceptance must be addressed to fully realize the potential of DSS. Ongoing research and development are essential to overcome these challenges and continue to advance the field of decision support systems.

## 4. CONCLUSION

This review has provided a detailed synthesis of how Decision Support Systems (DSS) enhance decision-making processes across multiple sectors, such as business, healthcare, agriculture, and emergency management. Our analysis confirms that DSS contribute significantly to strategic planning, operational efficiency, and evidence-based decisions through timely, relevant, and data-driven insights.

The literature consistently supports the value of DSS in improving decision quality, with notable sector-specific benefits such as increased patient safety in healthcare and optimized resource allocation in agriculture. These findings are reinforced by the integration of advanced technologies, including AI, ML, and big data analytics, which have elevated the capabilities of modern DSS platforms.

However, challenges remain. Implementation costs, system integration issues, and ethical concerns are persistent barriers. The discussion also emphasized that user acceptance and organizational readiness are critical success factors.

Future research should continue exploring the alignment of DSS with organizational strategies, the ethical deployment of AI in decision-making, and the development of domain-specific frameworks that maximize adoption and effectiveness.

In conclusion, DSS are not just tools but enablers of intelligent, responsive, and sustainable organizational practices. Addressing current limitations will unlock their full transformative potential.

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