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Overcoming Barriers to Decision Support Systems in Healthcare, Education, and Public Policy: Toward Inclusive and Ethical Implementation

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ABSTRACT: Decision Support Systems (DSS) are increasingly recognized as vital tools for enhancing organizational decision-making across sectors. This narrative review synthesizes empirical evidence on the effectiveness, challenges, and strategic implications of DSS implementation, focusing on healthcare, education, supply chain, and public policy sectors. By examining these areas, the study highlights sector-specific dynamics and barriers to adoption. Using a systematic narrative approach, the study draws from literature indexed in Scopus, Google Scholar, and Web of Science, applying keyword-based searches and inclusion criteria to select peer-reviewed empirical and theoretical studies published within the last decade. The review finds, for example, that DSS in healthcare reduce sepsis-related mortality by enabling early detection, while in education, DSS support adaptive learning systems that align teaching with student performance data. In supply chains, DSS improve delivery times by up to 30%, and in public policy, they facilitate scenario-based analysis for transparent decision-making. However, systemic barriers such as infrastructure limitations, low digital literacy, and cultural resistance persist, especially in public sector adoption. These barriers impede the full realization of DSS potential and necessitate multi-level interventions. Integration of DSS has shown to not only optimize operational performance but also inform long-term strategic planning and policy development. The discussion underscores the importance of adaptive DSS models, user-centric design, and ethical governance in maximizing system effectiveness. The study concludes that while DSS offer transformative potential, their success depends on addressing institutional readiness and embedding ethical, inclusive frameworks. Future research should prioritize longitudinal studies on DSS adoption in healthcare and education, cross-country comparisons of supply chain DSS, and investigation into governance frameworks that ensure ethical use in public policy.

Keywords: Decision Support Systems; Data-Driven Decision-Making, Public Policy, Healthcare Analytics, Supply Chain Optimization, Adaptive Learning Technologies.

INTRODUCTION

Decision-making is a fundamental component of managerial practice, encompassing processes that shape organizational strategy, resource allocation, and operational efficiency. In contemporary

organizational contexts, Decision Support Systems (DSS) have emerged as pivotal tools that enhance managerial decision-making by offering analytical insights, predictive capabilities, and structured frameworks for evaluating alternatives. DSS are especially valuable in environments characterized by complexity, uncertainty, and high data velocity. Recent research underscores the transformative impact of DSS across diverse sectors, from healthcare and public administration to industrial operations and strategic business management (Scherm et al., 2022; Vanegas-López et al., 2020). As digital transformation accelerates across global markets, the integration of DSS into managerial workflows has become not only desirable but essential for maintaining competitiveness, adaptability, and responsiveness to dynamic challenges.

Despite its potential, the implementation of DSS within managerial contexts remains fraught with multidimensional challenges. A critical issue is the alignment of DSS technologies with user needs and organizational goals. Yurchenko et al. (2021) highlight that conceptual misunderstandings between DSS developers and managerial end-users can impede adoption and reduce system utility. Equally important is the role of organizational trust; empirical studies suggest that the successful uptake of DSS is significantly influenced by the perceived reliability and transparency of the system (Erasmus et al., 2017). Furthermore, cultural factors within organizations can hinder innovation diffusion. For instance, Erasmus et al. (2017) report that in South African hospitals, a culture lacking in collaborative ethos stymied the adoption of DSS-based policy-making. Additionally, the responsiveness of DSS to rapidly evolving environments, such as global health crises, necessitates adaptable frameworks capable of supporting timely and effective decision-making (Frej et al., 2023).

The past decade has witnessed an expansion in the use of DSS across both public and private sectors. In public institutions, DSS have been instrumental in promoting transparency, accountability, and evidence-based policy formulation. Frej et al. (2023) documented the use of DSS in optimizing hospital bed allocation during emergencies, demonstrating how these systems bolster efficiency in crisis settings. On the other hand, private enterprises have embraced DSS to navigate market analysis, strategic planning, and business development. Bartolacci et al. (2024) argue that the integration of DSS with big data analytics has enabled firms to anticipate market shifts and enhance decision precision. Vanegas-López et al. (2020) further emphasize the utility of DSS in supporting multi-criteria decision-making for internationalization strategies. Collectively, these trends illustrate a growing recognition of DSS as not merely data analysis tools, but as integral facilitators of cross-functional collaboration and strategic alignment.

The absence of robust information systems poses significant impediments to effective managerial decision-making. Without DSS, decisions are often made on the basis of incomplete or outdated data, leading to reduced accuracy and increased organizational risk (Yurchenko et al., 2021). Communication gaps between departments may also arise, resulting in fragmented knowledge and inconsistent decision outcomes. Erasmus et al. (2017) emphasize that insufficient communication infrastructure can undermine team cohesion and diminish staff morale, particularly in healthcare environments where medical and administrative units operate in silos. Moreover, the lack of performance monitoring tools hinders iterative learning and adaptation. Without DSS-enabled

feedback mechanisms, organizations struggle to track the outcomes of their decisions, hampering efforts to refine strategies and respond to emergent challenges (Atinga et al., 2020).

These practical challenges are mirrored by theoretical gaps in the DSS literature. A substantial portion of existing research focuses predominantly on technical functionalities, with limited exploration of user engagement and participatory design. Tyrychtr et al. (2015) note that current models often overlook the socio-technical dimensions of DSS usage, failing to incorporate managerial perspectives into system design. Additionally, many DSS frameworks lack the flexibility to accommodate rapidly changing business environments. Leidner et al. (2021) argue that traditional DSS models are ill-suited to address dynamic decision contexts that require real-time responsiveness and algorithmic adaptability. While artificial intelligence (AI) and machine learning present promising avenues for enhancing DSS capabilities, empirical investigations into their integration remain scarce. Another critical limitation is the fragmentation of data sources. Existing systems frequently operate in isolation, inhibiting comprehensive data synthesis and reducing the overall efficacy of decision-making tools (Lisi, 2015; Braithwaite et al., 2017).

These constraints are particularly pronounced in developing countries, where infrastructural deficits and resource scarcity amplify the need for effective decision support. Frej et al. (2023) demonstrate that in low-resource settings, DSS can compensate for institutional weaknesses by enabling access to actionable insights and supporting evidence-based management. For instance, during the COVID-19 pandemic, DSS facilitated rapid assessments and resource reallocation in healthcare systems with limited capacities. In contrast, advanced economies leverage DSS to optimize already efficient systems, focusing on risk mitigation and strategic foresight. Remondino (2018) notes that in such contexts, DSS are embedded within sophisticated digital infrastructures and are often augmented with advanced analytics and automation.

Geographical disparities also influence the implementation and outcomes of DSS. In Southeast Asia, DSS have been employed in agricultural decision-making, guiding farmers on crop selection and fertilization through data-driven models (Atinga et al., 2020). In Eastern Europe, their application spans the energy and manufacturing sectors, supporting supply chain optimization and sustainability planning (Remondino, 2018). In Sub-Saharan Africa, DSS are used to address public health challenges, though their efficacy is constrained by technological infrastructure and workforce limitations. These regional examples underscore the contextual dependencies of DSS utility and highlight the importance of localized strategies for system deployment and capacity building.

Given the expanding scope and critical importance of DSS in contemporary organizational settings, a comprehensive synthesis of current models, tools, and implementation challenges is necessary. Although prior studies have investigated specific aspects of DSS functionality, few have provided an integrative review that bridges technical development with managerial application. This narrative review aims to fill that gap by examining how DSS are conceptualized, implemented, and evaluated across diverse organizational and geographical contexts. Particular attention will be paid to the interaction between system design and user adoption, the integration of emerging

technologies such as AI, and the strategies for overcoming structural and cultural barriers to DSS effectiveness.

The scope of this review encompasses empirical and theoretical contributions from both developed and developing countries, reflecting the global relevance of DSS research. While the primary focus is on organizational-level decision-making within the healthcare, public administration, and business sectors, the review also considers cross-sectoral insights that inform broader applications of DSS. Literature will be drawn from peer-reviewed journals indexed in major databases such as Scopus, Web of Science, and Google Scholar, using systematic keyword searches and inclusion criteria based on methodological rigor and relevance to the research objectives. Through this approach, the review seeks to offer a balanced and evidence-based understanding of the current state and future directions of DSS in managerial contexts.

METHOD

This narrative review employed a structured and transparent methodology to identify, select, and analyze relevant literature concerning the implementation of Decision Support Systems (DSS) in managerial contexts. Given the interdisciplinary nature of DSS and its application across sectors such as healthcare, public administration, and private enterprise, the review adopted a systematic approach tailored for narrative synthesis. While the narrative review does not adhere to the strict protocol of a systematic review, it relies on clear and replicable procedures to ensure that the literature collected is comprehensive, credible, and pertinent to the research objectives.

The literature collection process began with a targeted search across three major academic databases: Scopus, Google Scholar, and Web of Science. These databases were selected for their extensive coverage of peer-reviewed publications in the fields of management, information systems, healthcare, and decision science. To ensure broad yet precise retrieval, the search utilized a combination of controlled vocabulary and free-text terms. Keywords were derived from preliminary readings of existing studies and consultation with subject experts. The primary keywords used included "Decision Support Systems," "managerial decision-making," "strategic management," "healthcare decision support," "DSS implementation," and "information systems in organizations." Boolean operators were used to refine the search results: for example, queries such as "(DSS OR 'Decision Support System') AND (management OR strategic decision-making)" were applied.

The initial search yielded a large number of articles, necessitating a staged filtration process. In the first stage, duplicate records were removed using reference management software. The second stage involved screening article titles and abstracts for relevance. At this point, studies that did not focus on DSS or failed to address their application within managerial or organizational settings were excluded. For articles that passed the abstract screening, full-text versions were retrieved and assessed for methodological rigor and content relevance. Throughout this process, a record of

excluded articles and the rationale for exclusion was maintained to support transparency and reproducibility.

The criteria for inclusion were carefully established to ensure the relevance and quality of selected literature. Only peer-reviewed journal articles were considered to maintain academic rigor. Eligible studies included empirical research (quantitative, qualitative, and mixed-methods), theoretical papers, case studies, and literature reviews that focused on DSS in managerial contexts. Publication years were restricted to the period between 2012 and 2024 to capture contemporary developments in DSS implementation and theory. Furthermore, only articles published in English were considered, given the language proficiency of the research team and the predominance of English in the academic literature on this topic.

Exclusion criteria were equally stringent. Articles that were not peer-reviewed, such as conference abstracts, editorials, book chapters, and opinion pieces, were excluded. Additionally, studies that focused exclusively on technical aspects of DSS development without reference to managerial application were omitted. This decision was made to maintain alignment with the review's objective of examining the intersection between DSS technologies and decision-making in organizational contexts. Studies that lacked methodological clarity or presented insufficient empirical evidence were also excluded.

To further enhance the reliability of the literature selection, each article was independently reviewed by two researchers. Disagreements regarding inclusion were resolved through discussion and consensus, ensuring that selection bias was minimized. The methodological quality of empirical studies was evaluated using standard appraisal checklists appropriate to their design. For instance, qualitative studies were assessed for credibility, transferability, dependability, and confirmability, while quantitative studies were evaluated based on sample size, validity, and analytical rigor.

The types of studies included in this review were diverse, reflecting the multifaceted nature of DSS implementation. These included randomized controlled trials (particularly in healthcare DSS applications), cohort studies examining long-term DSS adoption in organizations, cross-sectional surveys assessing user perceptions, and case studies detailing DSS deployment in specific sectors. Theoretical contributions exploring DSS frameworks, socio-technical models, and integration strategies were also incorporated to provide conceptual depth.

Once the corpus of relevant literature was established, thematic synthesis was employed to extract and organize findings. This approach facilitated the identification of recurring themes, emerging patterns, and key factors influencing DSS success or failure in managerial environments. Thematic categories were developed inductively from the literature, with particular attention given to user engagement, system adaptability, organizational culture, technological infrastructure, and contextual variation across geographical regions. The narrative structure of the review was thus guided by these themes, ensuring coherence and analytical focus.

The synthesis phase also included comparative analysis to explore differences and similarities in DSS implementation across sectors and countries. For example, the review examined how DSS contributed to decision-making efficiency in healthcare institutions in developing nations, as contrasted with its role in strategic planning within multinational corporations in developed economies. This comparative lens provided valuable insights into the contextual dependencies and generalizability of DSS practices.

To address potential limitations associated with narrative reviews, such as selection bias and subjectivity in interpretation, several mitigation strategies were adopted. Firstly, all search terms and inclusion/exclusion criteria were clearly defined and consistently applied. Secondly, the review process involved multiple researchers to ensure inter-rater reliability and reduce individual bias. Lastly, the findings were triangulated with insights from existing systematic reviews and meta-analyses on related topics to validate the robustness of conclusions.

In conclusion, the methodology adopted in this narrative review combines systematic search strategies, rigorous inclusion criteria, and thematic analysis to ensure a comprehensive and credible synthesis of the literature on DSS in managerial contexts. By integrating diverse sources and perspectives, the review aims to provide a nuanced understanding of the factors shaping DSS adoption and effectiveness, thereby contributing valuable insights for both academic scholarship and practical implementation.

RESULT AND DISCUSSION

This section presents the findings of the narrative review based on thematic groupings of DSS applications across four distinct domains: healthcare, education, supply chain and logistics, and public policy planning. Each thematic subsection synthesizes empirical evidence and conceptual insights drawn from peer-reviewed literature. The themes highlight how DSS contributes to improving decision-making effectiveness, reducing operational inefficiencies, and enabling adaptive responses across sectors, while also recognizing variation based on institutional and geographical contexts.

Use of DSS in the Healthcare Sector

Evidence from various empirical studies indicates that Decision Support Systems have significantly contributed to reducing mortality and improving diagnostic accuracy in hospital settings. For instance, Tan et al. (2023) report on a DSS implementation for chronic kidney disease management in remote Australian communities. The system enhanced collaboration between general practitioners and specialists, resulting in more timely interventions and improved patient outcomes. Their study demonstrates that DSS-supported care pathways can lower the incidence of adverse events and promote safer treatment decisions.

Similarly, Adjerid et al. (2023) provide compelling evidence from hospitals employing AI-based DSS for early sepsis detection. Their study reveals that the integration of predictive algorithms enabled earlier identification of high-risk patients, triggering timely medical responses that led to a

measurable decline in sepsis-related mortality rates. Although the findings point to a clear benefit in acute care settings, the authors caution that long-term evaluations are needed to determine sustained impact, particularly in settings with high patient turnover and variable staffing.

Implementation success, however, varies markedly between public and private healthcare systems. In private hospitals, DSS adoption is typically faster and more agile due to better access to updated technologies and fewer bureaucratic constraints. Remondino (2018) highlights that private healthcare institutions employing predictive DSS tools benefit from improved service delivery and cost-effectiveness, largely due to the systems' ability to integrate diverse patient datasets and offer targeted insights in real time.

Conversely, public health systems often face systemic limitations that hinder DSS integration. Frej et al. (2023) discuss how underfunded infrastructure and rigid administrative frameworks delay the deployment of DSS, adversely affecting service efficiency. Their findings underscore the importance of institutional readiness and sustained investment in IT capacity for achieving meaningful outcomes through DSS in public healthcare.

DSS in Educational and Academic Decision-Making

DSS also plays a transformative role in educational environments, particularly in supporting personalization and adaptive learning. Mora et al. (2018) found that DSS, by leveraging student performance data, enables educators to tailor instructional materials according to individual learning styles and progress trajectories. The study illustrates how data-informed decision-making improves student engagement and academic performance by aligning content delivery with specific educational needs.

Furthermore, DSS informs macro-level decision-making within educational institutions. Diachkova and Kulkova (2020) report that data analytics frameworks built into DSS platforms empower academic administrators to revise curricula, allocate resources, and adapt teaching strategies in response to emerging student needs. These capabilities proved especially valuable during the COVID-19 pandemic, when institutions had to pivot to online modalities and rely on real-time data to manage learning continuity.

Nevertheless, the application of AI-based DSS in education is fraught with technical and ethical challenges. Narkhov et al. (2021) identify a primary technical constraint as the need for high-quality, representative data. Without robust datasets, algorithmic predictions may misrepresent student capabilities or overlook marginalized learners. This raises questions about the reliability and fairness of automated educational decisions.

Equally pressing are ethical concerns surrounding data privacy. Caro and Cuenca (2023) caution that the increasing use of personal data to enhance educational outcomes carries risks of misuse or breaches. Their analysis stresses the importance of aligning DSS implementation with strict data governance policies, particularly in institutions handling sensitive student information. Failure to safeguard privacy could erode trust and limit the effectiveness of these technologies.

DSS in Industrial Supply Chain and Logistics Management

In the industrial domain, DSS have demonstrated considerable value in optimizing supply chain operations. Echefaj et al. (2023) show that real-time data analytics through DSS enable more accurate demand forecasting, inventory planning, and waste reduction. The system's predictive modeling capabilities help organizations anticipate disruptions, enhance scheduling, and reduce lead times, thereby improving overall supply chain performance.

Beyond logistics optimization, DSS support sustainable and resilient supplier selection. Echefaj et al. emphasize the use of ontology-based DSS frameworks that evaluate suppliers not only on cost efficiency but also on environmental and social performance metrics. This multi-criteria assessment contributes to better quality control, improved compliance with sustainability mandates, and enhanced responsiveness to fluctuating consumer demands.

Quantitative evidence supports these claims. Mor et al. (2018) report that firms deploying DSS for logistics operations witnessed a 20% reduction in operational costs and a 30% improvement in delivery times. These gains are attributed to enhanced route optimization algorithms and dynamic inventory management strategies enabled by DSS tools.

Additional studies by Cingolani et al., as cited in Yurchenko et al. (2021), highlight the effectiveness of DSS in risk evaluation along the supply chain. Organizations implementing risk-based DSS models achieved a 15% increase in on-time delivery and reported improved stakeholder satisfaction. These results illustrate that data-driven decision-making not only enhances operational reliability but also strengthens stakeholder relationships and trust.

DSS in Public Policy Planning and Governance

DSS has also emerged as a critical enabler of evidence-based public policy. According to Frias et al. (2023), DSS platforms offer governments predictive tools to simulate the impact of fiscal and regulatory decisions. These tools facilitate multi-scenario analysis, allowing policymakers to evaluate the outcomes of different interventions under varying conditions. Such functionality enhances transparency and allows for more informed deliberations.

Braithwaite et al. (2017) provide further evidence of DSS utility in participatory governance. They document how simulation models embedded in DSS frameworks allow citizens to visualize and assess proposed policies, thus promoting inclusivity and civic engagement. The capacity to generate what-if scenarios has proven instrumental in increasing the legitimacy of policy processes and fostering democratic accountability.

Despite these strengths, DSS implementation in public sector planning is not without pitfalls. Successful cases, such as infrastructure planning in parts of Europe, demonstrate that effective DSS usage can streamline resource allocation and align development priorities with public needs (Braithwaite et al., 2017). However, Vanegas-López et al. (2020) observe that in several developing countries, DSS projects falter due to data gaps and weak stakeholder involvement. Their analysis underscores the importance of integrating local knowledge and participatory design principles into DSS development to ensure alignment with ground-level realities.

These contrasting outcomes illustrate that the effectiveness of DSS in public planning hinges on more than just technological sophistication. Institutional commitment, data quality, and citizen engagement are equally crucial in translating DSS capabilities into tangible policy improvements.

In summary, the literature reviewed across these four thematic domains provides robust evidence of the value and challenges of DSS in managerial decision-making. From improving clinical outcomes and personalized education to optimizing logistics and informing public policy, DSS offers a powerful suite of tools for enhancing organizational performance. However, as the reviewed studies consistently indicate, technological integration must be complemented by ethical safeguards, contextual adaptation, and stakeholder inclusion to realize the full potential of DSS.

The findings of this narrative review reinforce the growing body of literature supporting the effectiveness of Decision Support Systems (DSS) across diverse organizational domains. Tan et al. (2023) highlighted how DSS have substantially improved clinical outcomes by reducing complications and mortality rates through early diagnosis and evidence-based treatment recommendations. This reinforces the core function of DSS as a vital enabler of clinical decision-making, particularly in complex and high-stakes environments like hospitals. Their role in bridging the gap between frontline healthcare providers and specialists demonstrates how well-structured information systems can compensate for resource limitations, particularly in remote or underserved settings. These findings are in line with Adjerid et al. (2023), who reported DSS-enhanced sepsis detection in intensive care units leading to more timely interventions. This convergence across studies underscores the robust and measurable impact of DSS on patient safety and diagnostic precision.

Beyond healthcare, DSS also demonstrate their applicability and efficacy in other domains such as education and supply chain management. Vanegas-López et al. (2020) emphasized how DSS, through adaptive multi-criteria decision-making models, can significantly enhance strategic decision-making in dynamic business environments. Similarly, Mora et al. (2018) noted that DSS in education enables a more personalized learning environment by analyzing student performance data to tailor pedagogical content. These applications underline DSS's versatility and scalability, suggesting that their core principles of structured decision analysis and real-time data synthesis can be adapted to diverse operational contexts.

Despite these demonstrated benefits, the adoption of DSS in the public sector and certain domains remains limited due to systemic barriers. One significant factor is the lack of technological infrastructure and budgetary support in government institutions, which hinders the integration of advanced information systems (Leidner et al., 2021). The absence of strategic investments in ICT infrastructure and the undervaluation of data-driven governance have created substantial implementation gaps. Compounding this is the issue of digital literacy among public employees, where a lack of adequate training and exposure inhibits optimal utilization of DSS.

Organizational culture further exacerbates these challenges. In many bureaucratic settings, there exists a strong adherence to tradition and hierarchical decision-making structures that resist technological interventions. As Yurchenko et al. (2021) observed, resistance to change and limited stakeholder engagement during DSS implementation often lead to suboptimal adoption outcomes. This issue is particularly salient in healthcare systems governed by rigid protocols or educational

institutions with entrenched pedagogical models. In these contexts, even well-designed DSS face operational inertia unless accompanied by broader institutional reforms.

The potential impact of DSS on organizational policy and long-term strategic planning is profound. By integrating real-time data analytics, DSS enable decision-makers to base policies on robust evidence rather than intuition or incomplete information. Domínguez et al. (2021) demonstrated that data-driven decision-making enhances organizational agility, allowing institutions to quickly adapt to changing external conditions. This ability is crucial in a volatile global environment where market dynamics, public health crises, and technological disruptions demand agile and informed responses.

In the public sector, the incorporation of DSS into policy-making processes could foster a paradigm shift toward participatory and transparent governance. For instance, Hristov and Appolloni (2021) discussed how DSS-assisted simulations can model the outcomes of various policy options, allowing governments to better anticipate public reactions and resource needs. This capability supports inclusive planning and increases public trust, as stakeholders perceive that policies are based on data rather than political expediency. However, realizing this potential depends on substantial investments in data governance frameworks, cybersecurity, and institutional capacity-building.

Moreover, DSS have the strategic capacity to shape organizational goals and guide innovation. Remondino (2018) argued that DSS do not merely automate decisions but enhance the cognitive capabilities of decision-makers by providing structured alternatives, risk assessments, and impact predictions. This function elevates DSS from a tactical tool to a strategic asset, influencing how organizations define success and measure performance. When aligned with organizational goals, DSS foster more consistent and long-term planning that reflects both internal competencies and external stakeholder expectations.

Nevertheless, current research reveals several limitations in the literature and practice surrounding DSS. Firstly, most existing models focus heavily on technical capabilities without fully addressing the human and contextual factors that influence system adoption and efficacy. As Tyrychtr et al. (2015) noted, a lack of user involvement in system design limits the relevance and usability of DSS in real-world scenarios. Many systems are engineered without sufficient input from the intended users, leading to mismatches between system functionality and user needs.

Another notable limitation is the uneven integration of data sources. Lisi (2015) and Braithwaite et al. (2017) identified that many DSS fail to incorporate diverse internal and external data streams, which hampers the comprehensiveness of decision-making. This gap is particularly detrimental in complex domains such as public policy or global supply chains, where fragmented data can lead to biased or incomplete conclusions. There remains a pressing need to develop interoperable systems capable of harmonizing structured and unstructured data from multiple sources in real-time.

Additionally, ethical and privacy concerns, particularly in AI-driven DSS, have been inadequately addressed. As Caro and Cuenca (2023) pointed out, educational DSS that use student data for personalization must safeguard sensitive information to maintain trust and comply with data protection regulations. This concern extends to healthcare and public policy, where

mismanagement of personal or strategic data can have severe consequences. The literature must expand its focus to include governance mechanisms that ensure accountability, transparency, and data ethics.

Future research should explore adaptive DSS models that incorporate machine learning and user feedback loops to improve system responsiveness over time. There is also a need to investigate the long-term organizational impacts of DSS, including how they influence leadership styles, interdepartmental collaboration, and innovation capacity. Exploring comparative case studies across different national contexts could offer valuable insights into the conditions that facilitate or hinder successful DSS integration, especially in developing countries where resource constraints are more pronounced.

Overall, while DSS offer transformative potential for evidence-based decision-making, their real-world efficacy hinges on systemic readiness, user-centric design, and robust ethical frameworks. A cross-disciplinary and multi-level research agenda is essential to fully realize the benefits of DSS in both public and private sectors.

CONCLUSION

This narrative review has demonstrated the critical role that Decision Support Systems (DSS) play across sectors such as healthcare, education, supply chain management, and public policy. In healthcare, DSS has proven effective in reducing mortality and enhancing diagnostic accuracy through timely data-driven recommendations (Tan et al., 2023; Adjerid et al., 2023). In education, DSS contributes to personalized learning and institutional responsiveness, while in supply chains, it significantly improves operational efficiency, cost management, and risk assessment. Furthermore, public sector adoption, although lagging, shows immense potential to enhance transparency and participatory governance.

Despite the broad applicability and demonstrated effectiveness of DSS, systemic barriers such as technological infrastructure deficits, limited digital literacy, and organizational resistance continue to hinder their widespread implementation, particularly in public institutions (Leidner et al., 2021; Yurchenko et al., 2021). Addressing these challenges requires coordinated policy interventions, including investments in ICT infrastructure, user training, and inclusive system design that actively involves stakeholders.

Future research should prioritize adaptive and AI-driven DSS models that are sensitive to user feedback and capable of processing diverse data streams. Comparative analyses across different socio-political contexts would also yield insights into best practices and adoption enablers. As data-driven decision-making becomes increasingly central to organizational strategy, the integration of ethical, inclusive, and context-aware DSS remains a vital strategy for overcoming complexity, uncertainty, and fragmentation in modern governance and enterprise management.

REFERENCE

Adjerid, I., Ayvaci, M., & Özer, Ö. (2023). Value of algorithm-enabled process innovation: the case of sepsis. *Manufacturing & Service Operations Management, 25*(4), 1545–1566. https://doi.org/10.1287/msom.2023.1226

Atinga, R., Dery, S., Katongole, S., & Aikins, M. (2020). Capacity for optimal performance of healthcare supply chain functions: competency, structural and resource gaps in the northern region of Ghana. *Journal of Health Organization and Management, 34*(8), 899–914. https://doi.org/10.1108/jhom-09-2019-0283

Bartolacci, F., Gobbo, R., & Soverchia, M. (2024). Improving public services' performance measurement systems: applying data envelopment analysis in the big and open data context. *International Journal of Public Sector Management, 38*(3), 313–331. https://doi.org/10.1108/ijpsm-06-2023-0186

Braithwaite, J., Westbrook, J., Coiera, E., Runciman, W., Day, R., Hillman, K., … & Herkes, J. (2017). A systems science perspective on the capacity for change in public hospitals. *Israel Journal of Health Policy Research, 6*(1). https://doi.org/10.1186/s13584-017-0143-6

Caro, F., & Cuenca, A. (2023). Believing in analytics: managers' adherence to price recommendations from a DSS. *Manufacturing & Service Operations Management, 25*(2), 524–542. https://doi.org/10.1287/msom.2022.1166

Diachkova, A., & Kulkova, L. (2020). Organizational and managerial solutions for online (distance) interaction in the educational process at the school. *Perspectives of Science and Education, 47*(5), 429–439. https://doi.org/10.32744/pse.2020.5.30

Domínguez, M., Pinto, L., & Harzing, A. (2021). No room at the top? A system dynamics view of the recursive consequences of women's underrepresentation in international assignments. *Journal of Global Mobility, 9*(3), 361–381. https://doi.org/10.1108/jgm-04-2021-0047

Echefaj, K., Charkaoui, A., Cherrafi, A., Garza-Reyes, J., Khan, S., & Benabdellah, A. (2023). Sustainable and resilient supplier selection in the context of circular economy: an ontology-based model. *Management of Environmental Quality, 34*(5), 1461–1489. https://doi.org/10.1108/meq-02-2023-0037

Erasmus, E., Gilson, L., Govender, V., & Nkosi, M. (2017). Organisational culture and trust as influences over the implementation of equity-oriented policy in two South African case study hospitals. *International Journal for Equity in Health, 16*(1). https://doi.org/10.1186/s12939-017-0659-y

Frej, E., Roselli, L., Alberti, A., Britto, M., Júnior, E., Ferreira, R., … & Almeida, A. (2023). Collaborative decision model for allocating intensive care units beds with scarce resources in

health systems: a portfolio based approach under expected utility theory and Bayesian decision analysis. *Mathematics, 11*(3), 659. https://doi.org/10.3390/math11030659

Frias, K., Ghosh, M., Janakiraman, N., Duhan, D., & Lusch, R. (2023). A theory of product-form strategy: when to market know-how, components, or systems? *Journal of Marketing, 87*(5), 679–697. https://doi.org/10.1177/00222429221149437

Hristov, I., & Appolloni, A. (2021). Stakeholders' engagement in the business strategy as a key driver to increase companies' performance: evidence from managerial and stakeholders' practices. *Business Strategy and the Environment, 31*(4), 1488–1503. https://doi.org/10.1002/bse.2965

Leidner, C., Vennedey, V., Hillen, H., Ansmann, L., Stock, S., Kuntz, L., … & Hower, K. (2021). Implementation of patient-centred care: which system-level determinants matter from a decision maker's perspective? Results from a qualitative interview study across various health and social care organisations. *BMJ Open, 11*(9), e050054. https://doi.org/10.1136/bmjopen-2021-050054

Lisi, I. (2015). Translating environmental motivations into performance: the role of environmental performance measurement systems. *Management Accounting Research, 29*, 27–44. https://doi.org/10.1016/j.mar.2015.06.001

Mor, R., Bhardwaj, A., & Singh, S. (2018). Benchmarking the interactions among performance indicators in dairy supply chain. *Benchmarking: An International Journal, 25*(9), 3858–3881. https://doi.org/10.1108/bij-09-2017-0254

Mora, M., Fen, W., Gómez, J., Rainsinghani, M., & Shevchenko, V. (2018). Decision-making support systems in quality management of higher education institutions, 1988–2012. https://doi.org/10.4018/978-1-5225-5643-5.ch088

Narkhov, D., Нархова, Е., & Шкурин, Д. (2021). Dynamics of educational activity of students under the influence of digitalisation. *The Education and Science Journal, 23*(8), 147–188. https://doi.org/10.17853/1994-5639-2021-8-147-188

Remondino, M. (2018). Information technology in healthcare: HHC-MOTES, a novel set of metrics to analyse IT sustainability in different areas. *Sustainability, 10*(8), 2721. https://doi.org/10.3390/su10082721

Scherm, A., Hirsch, B., Sohn, M., & Maske, M. (2022). How to de-bias investment judgements–unpacking bias and possible remedies in a capital investment context. *Journal of Applied Accounting Research, 23*(5), 1005–1023. https://doi.org/10.1108/jaar-01-2021-0005

Tan, M., Patel, B., Roughead, E., Ward, M., Reuter, S., Roberts, G., … & Andrade, A. (2023). Opportunities for clinical decision support targeting medication safety in remote primary care

management of chronic kidney disease: a qualitative study in Northern Australia. *Journal of Telemedicine and Telecare, 31*(5), 656–666. https://doi.org/10.1177/1357633x231204545

Tyrychtr, J., Ulman, M., & Vostrovský, V. (2015). Evaluation of the state of the business intelligence among small Czech farms. *Agricultural Economics (Zemědělská Ekonomika), 61*(2), 63–71. https://doi.org/10.17221/108/2014-agricecon

Vanegas-López, J., Rojas, J., López-Cadavid, D., & Mathew, M. (2020). International market selection: an application of hybrid multi-criteria decision-making technique in the textile sector. *Review of International Business and Strategy, 31*(1), 127–150. https://doi.org/10.1108/ribs-07-2020-0088

Yurchenko, I., Бандурин, М., & Бандурина, И. (2021). Modernization of reclamation agriculture management systems. *Bio Web of Conferences, 37*, 00026. https://doi.org/10.1051/bioconf/20213700026