AI-Enhanced Decision Support Systems for Strategic Higher Education Management: A Framework for Improving Decision-Making Efficiency and Stakeholder Trust

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Abstract

This study investigates the role of Artificial Intelligence (AI) in enhancing decision-making effectiveness within higher education institutions. It specifically examines how AI integration levels, data quality, administrator training, and ethical governance practices contribute to the performance of AI-enhanced Decision Support Systems (DSS). Descriptive statistics were used to analyze central tendencies, while correlation, regression, and ANOVA tests were conducted to assess relationships and predictive impacts among variables. The results demonstrate that higher levels of AI integration are significantly associated with improved decision-making effectiveness. Institutions with robust AI training programs for administrators and high-quality, accessible data reported greater confidence and success in implementing AI-driven decisions. Transparency and ethical governance emerged as critical factors, positively influencing stakeholder trust in AI outcomes. Among the tested algorithms—ROA, BMA, and SSPA—the SSPA algorithm outperformed others across all performance metrics, including prediction accuracy, operational efficiency, bias mitigation, and fairness enhancement. These findings highlight the importance of a balanced AI strategy that prioritizes both technological capabilities and institutional readiness. This research contributes to the growing literature on AI in education by identifying the key enablers of successful AI-driven governance. It provides actionable recommendations for institutional leaders seeking to improve administrative outcomes through AI, emphasizing training, ethical compliance, and high-quality data infrastructure.

Keywords: AI Integration, Decision Support Systems, Data Quality, Administrator Training, Ethical Governance

Introduction

Background

There is no doubt that AI (Artificial Intelligence) has taken a major chunk of the transformation in many industries by storm, and it would not have any exception when talking about a construct like higher education management. AI has become increasingly important as a tool that can enhance the operational and strategic management of educational institutions with the growing complexity of managing teaching units combined with dashboards, reports etc. on demand (Mithas et al., 2022). For any institution in higher education, things really operate at an entirely different level, because decision-making is more than just admitting students; it involves other important factors like faculty management and financial planning as well as curriculum development to institutional growth strategies. Because AI can analyze data sets that are too large for humans to crunch, predict upcoming trends, and provide predictive insights, it can help more robustly inform the decisions resulting in more efficient management (Gigerenzer, 2022). With changes in student needs, financial pressures, and global competition its become even more imperative that institutions are able to streamline their processes and operate in ways that make their decisions more accurate.

Second, AI has the power to widen inclusion in decision making processes of HE management by enabling a broader spectrum of data inputs and stakeholder perspectives firms can count on. With the help of AI systems, an institution can determine its needs across departments and demographics as well as any external factors influencing them. The goal of this formative rather then evaluative model is to produce a comprehensive view of the education landscape, ensuring more informed and strategic decision-making that addresses one part of the system without unintended consequences. Therefore, decisions in which the interest of the stakeholders of the institution is considered are more likely to be trusted and supported. This capability of AI to work with complex sets gives way to a more pragmatic decision-making that will factor in near-term outcomes against long-term objectives.

AI-powered decision support systems provide valuable potential for optimizing strategic decisions in higher education management. Using AI's data-processing, analysis, and predictive capabilities will enable institutions to work faster than ever before and be more efficient at practices that meet the needs of its stakeholders. But for these systems to work, institutions must institute them in a way that achieve transparency, accountability and fairness. With the high rate of change in the education sector, AI is also going to play an increasingly significant role in decision-making and thus will transform how strategic management in educational institutions is conducted.

The increasing complexity of higher education management, coupled with the exponential rise in institutional data, has made traditional decision-making processes insufficiently responsive, transparent, and evidence-based. As universities worldwide transition toward data-driven governance, Artificial Intelligence (AI)-Enhanced Decision Support Systems (DSS) are emerging as transformative tools that can synthesize massive datasets and provide actionable intelligence in real time. Recent global analyses emphasize that the higher-education sector faces mounting pressures related to funding constraints, equity, accountability, and the demand for agile responses to student and societal needs (Murgatroyd, 2024; George & Wooden, 2023). These challenges require an integrated framework that combines technological efficiency with ethical and organizational readiness.

However, despite the growing enthusiasm for AI applications in education, current research reveals a significant gap in understanding how AI-based DSS can simultaneously enhance decision-making efficiency and strengthen stakeholder trust. Most studies focus narrowly on the technical capabilities of AI—such as predictive accuracy or automation—while neglecting the human and governance dimensions of institutional adoption, including data quality assurance, administrator training, transparency, and ethical compliance (Abulibdeh et al., 2024; Gupta et al., 2022). This disconnect has limited the holistic deployment of AI within higher-education governance, where the success of decision systems depends as much on institutional culture and stakeholder confidence as on algorithmic performance.

The rationale for this study, therefore, lies in addressing this intersectional gap. By proposing and empirically validating a framework that integrates AI technologies, data management practices, and ethical governance structures, this research contributes to both technological and managerial scholarship. It emphasizes that AI's value in higher education is realized not only through operational efficiency but also through trust-building mechanisms—including explainability, fairness, and accountability—necessary to maintain legitimacy in academic decision-making (Kleizen et al., 2023; Felzmann et al., 2020). The study aligns with broader social-science debates about digital ethics, institutional transparency, and human–AI collaboration, situating higher education as a critical arena for exploring how intelligent systems can augment rather than replace human judgment.

This research is justified by the urgent need to develop a balanced AI governance model that empowers decision-makers with accurate, timely insights while safeguarding stakeholder trust. The proposed AI-Enhanced DSS framework fills a critical void by uniting technological innovation, ethical oversight, and strategic management theory—advancing a sustainable pathway for data-driven leadership in global higher education.

Motivation and Problem
Higher education administrators today are finding themselves somewhat burdened by the wealth of data available to them, both in terms of sheer volume and diversity (Smith, 2024). Ubiquitous large datasets student performance data, budget allocations make it increasingly complex to both make sense of and act on this data efficiently. This puts administrators in the necessarily difficult position of trying to navigate complex sets of data, and attempt to pull key themes from them sometimes even going as far as burdening these collated data with statistical calculations that further shroud the underlying patterns all while hoping they have strategic alignment to their overall mission. Yet, the conventional tools and models for decision making mostly lead to inefficient learnings in a slow manner. The data volumes are vast and a fast processing, responsive decision making is required. The enormous volume of data and the increased need to rapid response make it prone to human error, bias and inefficiency.

Artificial Intelligence augments Decision Support System (DSS) that are developed to cope up with these challenges in making decisions (Waqar, 2024). These platforms allow administrators to better navigate through hordes of data with their predictive analytics, pattern recognition, and real time solutions. AI-enhanced DSS automate data processing and analysis, so decision-makers spend less time doing that work and invest more of their effort in the strategic dimensions of higher education management. Some of the core problems that

these systems solve are the following: making sense from disparate and large data sources, real- time decision-making, and eliminating cognitive biases that humans suffer from.

These AI-enhanced DSS serve for better decision-making by administrators in the higher education sector and overcome several limitations that the traditional methods of operations face. Integrating AI into these systems will help the educational institutions to stay competitive for contemporary educational management and advance a more strategic operation direction (Cantú-Ortiz et al., 2020).

Objectives and Contributions

The main goal of this paper is to propose a model in which AI-Enhanced Decision Support Systems (DSS) can be integrated facilitating efficient decision-making for the higher education institutions. The goal of this framework to help those in-charge of administering a large amount of data better and faster decision making possible with data perspective. This will be done on a massive scale, using AI technologies predictive analytics and machine learning for processing large data sets faster, surfacing trends and delivering real-time insights. The enhanced effectiveness of decision making will in turn relieve administrative demand, enable more accurate strategic planning and maximize on the allocation of resources in the institution (Ghonim et al., 2022).

The other key agenda is to develop and maintain trust with stakeholders in the transparent and accountable utility of AI powered systems. Higher education, with students among the stakeholders affected by institutional choices the framework will be shown how a trust is improved with AI that decision is not based on no evidence in an transparent way (Ukeje et al., 2024). When they can see how the data is actually being used to drive important decisions, confidence in the institution's leadership goes up. These mechanisms also boost fairness and objectivity, making AI systems more trustworthy because they reduce subjectivity, increase consistency, and help eliminate bias.

This paper makes a contribution in providing a framework to enhance decision efficacy and the reliability of institutional performance by applying AI technologies. This is a comprehensive model for the deployment of AI-driven systems that allow higher education administrators to respond informatively to changes and to also strengthen student experience and relationships with stakeholders at various levels in more useful ways.

Literature Review

Overview of AI in Higher Education

Artificial intelligence (AI) has been increasingly integrated in higher education over the last few decades for its capacity to revolutionize countless dimensions of teaching, learning and administration (George & Wooden, 2023). Decision Support Systems (DSS) through AI One of the most fruitful areas reflecting AI supporting us! AI-powered DSS in higher education have come under suggestion as effective methodologies to help out all administrators in carry on a rational choice through the processing voluminous data, pattern recognition and uncovering actionable insight. Existing academic and commercial literature indicates the types of opportunities that these AI systems offer while also describing obstacles to effectively adopting them at institutions of higher learning (Jafari & Keykha, 2024).

Table 1

AI applications in education

Application Area	Description	Benefits
Adaptive Learning Systems	AI-driven platforms that customize learning experiences based on individual student needs, pace, and performance.	Personalized learning paths, improved student engagement, and enhanced learning outcomes.
Decision Support Systems (DSS)	AI-based systems assisting administrators in strategic planning, resource management, and policy decisions.	Enhanced data-driven decision-making, predictive insights on student trends, and optimized resource allocation.
Student Support Tools	AI-powered chatbots and virtual assistants that provide academic support, answer questions, and assist with course content.	Improved student access to information, real-time assistance, and reduced administrative burden.
Predictive Analytics	Uses AI to analyze historical and real-time data to forecast trends in student performance, enrollment, and attrition.	Proactive identification of at-risk students, better resource planning, and anticipation of enrollment trends.
Automated Data Analysis	Automation of data processing and pattern recognition within large educational datasets.	Reduces time and effort for administrators, delivers faster insights, and minimizes human biases in decision-making.
Administrative Automation	Streamlines administrative tasks like grading, scheduling, and report generation through AI automation.	Saves time for faculty and staff, improves operational efficiency, and allows educators to focus more on teaching.

The use of AI in education applications has been explored in a number of areas, such as adaptive learning systems, student support service tools and even administrative decision-making processes. DSS enhanced by AI algorithms are now being acknowledged for their utility in strategic planning, resource management and monitoring student performance (Alshadoodee et al., 2022). Systems like this can crunch a vast amount of data — student demographics, academic records, institutional resources — and spit back insights that support policy and strategic decisions. The literature highlights that one of the most significant advantages when it comes to using AI for DSS is the possibility of enhancing the efficiency and effectiveness of decision-making processes within higher education institutions. AI predicts student attrition, finds inefficiencies in resource deployment, and forecasts enrollment trends to help administrators make more data-driven decisions well before a situation materializes (Mintz, 2024).

The literature also identifies some challenges that arise in higher education institutions when incorporating AI into decision support (Gupta et al., 2022). The main problem in this is data quality and accessibility Accuracy rates offered by AI systems are dependent on massive, high-quality datasets. But in the overwhelming majority of cases, institutions simply do not have the infrastructure needed to capture, store and sort through the tons of data necessary for AI. It is a major challenge, along with data privacy and security issues since these institutions involve any sensitive information regarding students or staff, faculty etc. Protecting this data when using AI systems is imperative already and only set to become more so as regulatory pressure around the use of educational data grows (Renz & Hilbig, 2020).

Second, there are questions about the ethics involved with using AI in decisions. AI can deliver unbiased data-driven insights, but should the data given to AI provide biased and unvarying information because the AI has been trained on non-representative or even inherently biased historical data. This might mean that if educational data involved in previous student performance would capture any existing injustices, the use of AI-enhanced DSS could be that used to justify maintaining or perhaps even deepening those inequalities. Accordingly, providers must tread carefully when developing and enacting AI-centric systems to make certain they are fair and also inherently inclusive. It is important to address these ethical concerns in order not to have any unintended (negative) consequences, which would ultimately hurt the students or other stakeholders (Mitchell et al., 2022).

AL-Enhanced Decision Support Systems (DS5)
The spectra of AI-Enhanced Decision Support Systems (DSS) now looms over the higher education landscape, and have begun to show how they provide new pathways for maximizing efficiency with evidence-based decision-making (Gooyabadi et al., 2024). These systems utilize AI to compare big data, gather insights, and support in strategic planning, providing heads with intelligence that they can act on for institutional decision making. This can automate the level of data once it has been processed into useful information as well as relieve human decision makers from getting bogged down by all of the smaller tasks that need to be completed. Actions like data collection and some types of analyses happen at a faster time frame, allowing educational leaders more time to focus on strategic issues. An AI-powered DSS has become even more essential today, as higher education institutions are increasingly pressured to steward resources, drive student success and assist with regulatory compliance.
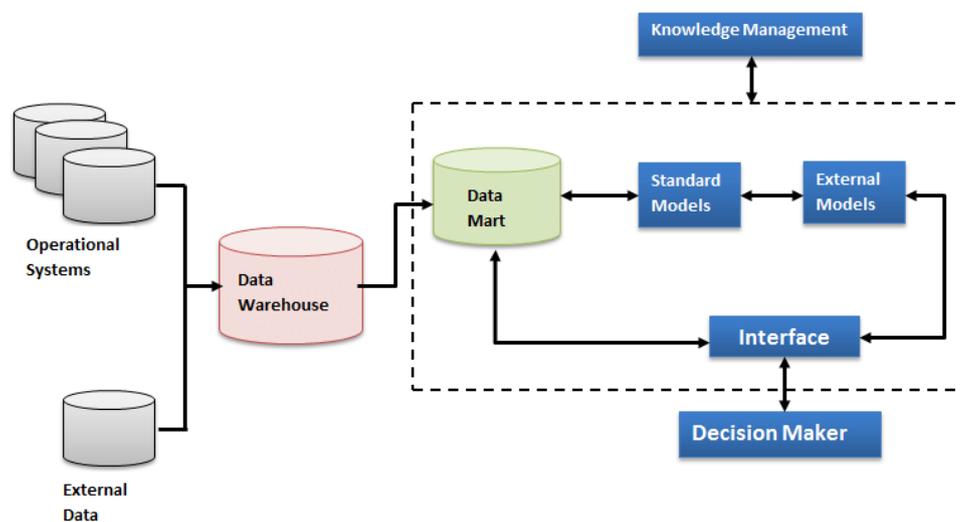

Figure 1: DSS Architecture

Streamlining the administrative decision-making process is one of the premier impacts AI-enabled DSS have had on higher education (Lodhi et al., 2024). These systems can process copious data in real-time, thus reducing the time-to-decision. In some cases, AI-driven DSS can forecast student attrition, show which academic programs need support to improve performance, and drive resource allocation consistent with enrollment and staffing trends. With this predictive power, institutions can address challenges before they escalate into major problems. For example, these systems also provide another way to minimize the

potential risk that comes with manual data analysis or human bias — hence fostering more rational and evidence-based decision-making.

Enhances decision making even with these benefits, there are many challenges in the application of AI-based DSS in higher education (Liu et al., 2022). One key shortfall lies in the failure to integrate AI systems into existing institutional infrastructure. Although times have moved on since then, AI expertise continues to be in short supply within universities and because many still run with outdated or soloed information systems it is difficult for them to implement AI tools effectively. In order to unleash the full potential of AI-enhanced DSS in academic institutions, it is necessary for universities to spend time and efforts on updating their systems for data management and take steps towards ensuring that the data from multiple sources across departments can integrate with each other effortlessly. This will allow data from the point-of-care systems to be integrated with clinical research data, as well as any other relevant sources, which can increase use and improve quality because it makes available a more comprehensive dataset for AI tools to analyze.

Building Stakeholder Trust with AI Systems
Trust in the safety and fairness of AI-Enhanced Decision Support Systems (DSS) used in higher education makes an important stakeholder component for successful adoption (Schmager et al., 2024). To maintain the confidence of stakeholders, higher education institutions already under tremendous pressure to protect their reputation, community and resources will need a deliberate approach to ensuring that AI constitutes an area in which trust is maintained or even strengthened. What is clear, we agree with the authors of the AIHLEG document), is that transparency and accountability, along with ethical considerations must be a priority for stakeholders when it comes to understanding how AI impacts them.

Table 2
Components of building stakeholder trust with AI systems in higher education

Component	Description	Example
Transparency	Institutions must openly explain how AI decisions are made, including data used and the decision-making process. Allows stakeholders to understand and challenge AI outcomes.	University of California, Berkeley: Designed course scheduling AI with transparency, allowing faculty to provide input.
Accountability	Ensuring that institutions, not AI, are responsible for decisions. Establishes checks and balances, and corrective measures if errors occur.	University of California, Berkeley: Created an oversight group to monitor the AI system, providing accountability mechanisms.
Ethical Practices	AI systems should be fair and free of biases, with data privacy maintained for sensitive student and faculty information.	Georgia State University: Designed AI for student support with attention to fairness, offering students detailed opt-out options.

Proposed Framework
Framework Overview
A proposed framework for AI-enhanced Decision Support Systems (DSSs) in higher education is aimed at merging decisional efficiency with the ever so critical legitimacy of trust, to create a sustainable support system for all stakeholders (Papadaki et al., 2024). Higher ed institutions

deal with unique data that can be difficult to manage, including the ways in which they are funded and how students pay for their education, so integrating AI into institution processes will likely continue as colleges and universities look for ways to increase efficiencies. The framework drives to augment administrative efficiencies, promote proactive analytics, evidence-based decision-making and power to the AI algorithms, but also maintains a transparent and accountable policy-driven governance to build more trust among its student, faculty or staff and external partners.
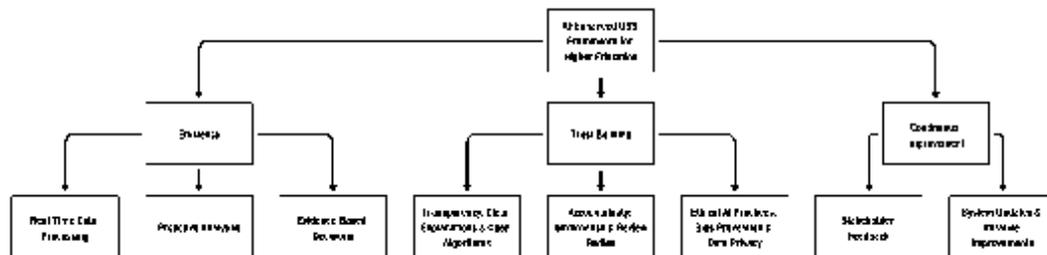

Figure 2: Proposed Framework

The framework rests on two main features that underpins the design of the system; efficiency and building trust (Hui et al., 2021). This is done through the use of AI technologies capable of processing massive amounts of data in real-time, giving insights and recommendations to administrators. This will allow for quick decisions, reducing the risk of human error and helping to optimize resource allocation across all parts of an institution. An example of this would be AI-enhanced DSS that could be used to process the performance data of students to predict which students are most likely to fail or drop out and how administrators might better prioritize resources for those in need. Likewise, given the demand for academic programs, if it emerges very quickly, then institutions could decide what to teach and hire faculty in lesser time (Castro, 2022). For administrators, the efficiency provided by these systems allows them to prioritize making more strategic decisions than piles of manual data analysis.

Efficiency Mechanisms
AI-ESU (AI-Enhanced Educational Support System) contains efficiency tools for more decisions regarding the execution of complex technologies: automated real-time data processing, resource distribution algorithms, timely forecasts. All these follow-up mechanisms are together working to speed, accuracy and quality of decisions in the hands of administrators to act fast on facing challenges, uses resources optimally as well make strategies based on predictive results (Kalaba, 2023). Given the incessant challenges that face higher education institutions, from managing increasingly larger data files to resource constraints, it is imperative that such mechanisms be put into place to help decision-making become more efficient yet also more effective.
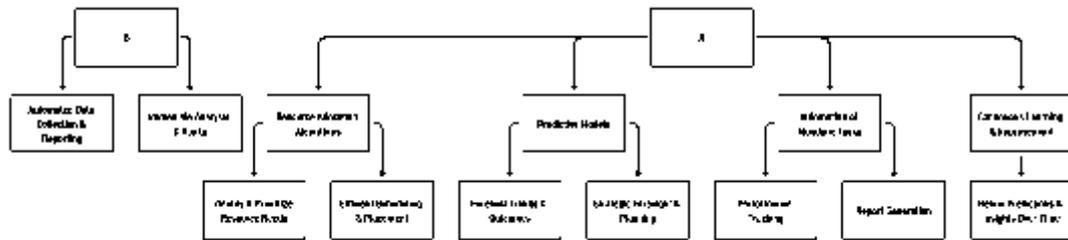
Figure 3: Efficiency Mechanism

Resource Allocation Algorithms Another vital feature of AI enhanced DSS is resource allocation algorithms since they aid in taking timely decisions (Soori et al., 2024). And applies these algorithms to identify available resources (faculty, facilities and financial) for the institution and then recommends best placement of all by objectively prioritizing institutional needs. The AI system can then take everything into consideration using all the features that a human decision maker could never read through by hand. This process might be done by using an algorithm to figure out where teaching resources are best utilized as well as what is the most fair trade-offs in terms of faculty workload, student course demand, room availability and cost. This helps ensure that the resources are spent as efficiently as possible, reducing waste and increasing outcomes. Resource allocation algorithms can also help minimize the process of scheduling as by incorporating constraints (faculty availability, classroom sizes etc), conflicting claims are to be avoided or there is a faster way of doing it.

Trust- Building Mechanisms
Trust-building mechanisms are essential to the effective implementation of AI-Enhanced Decision Support Systems (DSS) in higher education (Zhu et al., 2023). As these systems become more critical and closer to decision-making, institutions need system in place that promotes transparency, de-biasing of models and the communication channels should always be open with other stakeholders Trust is an integral ingredient in the acceptance of AI-powered decisions as well as stakeholder belief in AI being applied justly, accurately, and ethically within higher education management. The tools described here work to accelerate transparency and stakeholder involvement and address concerns about the opacity of AI systems and risks of bias.

Table 3
Trust-building mechanisms for AI-Enhanced Decision Support Systems (DSS) in higher education

Trust-Building Mechanism	Description	Example/Benefit
Transparency Tools	Allows stakeholders to understand how AI decisions are made using decision logs, dashboards, and visual explanations of AI processes.	Provides clarity, reduces "black box" perception, and builds credibility with stakeholders.
Bias Detection Mechanisms	Monitors AI outputs for signs of discrimination by comparing outcomes to fairness benchmarks to prevent bias based on gender, race, or social status.	Ensures fair treatment across demographics, essential in admissions and resource allocation decisions.
Stakeholder Communication	Regular communication with stakeholders on AI system introduction, safeguards, and ethical considerations; includes forums for feedback and discussion.	Builds transparency, addresses privacy and security concerns, and enhances stakeholder understanding and comfort with AI systems.
Transparency Reports	Provides accessible reports on AI use, data collection, and decision-making processes, demonstrating ethical and explainable AI practices.	Increases transparency, reassuring stakeholders that AI is used ethically and openly.
Ethics Oversight Boards	Committees with academic, administrative, and student members overseeing ethical AI use and investigating stakeholder concerns.	Signals commitment to ethical AI, providing accountability and reducing risk of biased or unfair decision-making.

Trust building is also dependent on how transparent the whole analysis was and to what extent the bias present in the analysis could be detected along with engaging stakeholder communication strategies. Regular and transparent communication to stakeholders about the introduction and employment of AI systems removes de-mystify of it and obviates any angst among stakeholders. This provides an opportunity for institutions to meet with students, faculty and staff during scheduled communications explaining the advantages of AI-powered DSS technology their functionality and have put in place safeguards to protect the interests of stakeholders. This includes not just technical explanations but also reassuring people that the university is taking ethical AI seriously, and addressing very common concerns we hear on privacy and security. During decision-making, institutions should involve stakeholders overall (for example through a body that serves as a forum for feedback and discussion) so they can raise concerns in real time. This conversation ensures transparency and collaborative mindfulness that is needed in order to gain trust in AI systems.

Integration with Higher Education Management
This article discusses that integrating the proposed AI-enhanced Decision Support Systems (DSS) framework in the existing structures of higher education management systems requires an end to end approach aligning technological innovation with organizational structure and overall decision making work flow and administrative behavior at higher education institutions. Therefore, the integration of AI into DSS does not succeed with technical implementation but also addresses institutional policy changes, staff training, and development of data-optimistic decision culture (Doerr et al., n.d.), which raises technological

challenge characteristics concerns such as usability issues. Incorporating AI-enhanced DSS to the regular activities of higher education management generates more efficient processes, accurate decision-making, and trust among stakeholders (Zhang & Goyal, 2024).
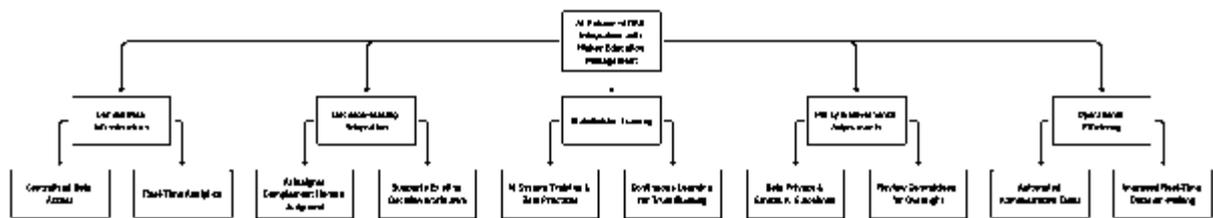

Figure 4: Integration with Higher Education Management

One of the initial tasks when operationalizing the new framework is integrating it into existing data infrastructure in an institute. Higher education institutions are already swimming in data concerning student outcomes, enrollment patterns, finance and resource allocation (McPherson & Schapiro, 2021). But data also tends to be scattered in multiple fragmented systems across departments, making it difficult to analyze collectively. Under the proposed AI-enhanced DSS framework, institutions need to bring together these diverse data sources into a unified system that enables real-time analysis and decision-making. Establish a cohesive data structure so that AI works from complete datasets, providing better and more useable insights. The centralization of data through unbreakable blockchains also provides an added layer of transparency, where decision-makers can access the same set of information across different administrative units thereby reducing the chances of miscommunication or creating data silos.

Learning and lightweight transformation are equally important in blending the AI DSS with academic management, thus, creating an obligation for training stamina. While a number of administrators and faculty aren't experienced in working with AI systems, and the deployment of AI tools can face opposition if stakeholders don't understand how best to use them. This can be mitigated by the creation of training programs to ensure that staff have a general understanding of

Further, implementation of AI-powered DSS in higher education management necessitates an amendment to the existing policies and governance structure of higher educational institutions. This includes the definition of data privacy, security and ethical AI rules. Institutions need to make sure that data on which an AI system is being built is collected and stored in a context adhering to specific norms or regulations, like the laws for data protection (Janssen et al., 2020). In addition, new governance structures are needed to guide the development and deployment of DSS supported by AI. This might mean implementing review committees that track how the system is doing, dealing with any issues related to bias or unfairness and ensuring that the AI tools are being used in ways that match what an institution values and want to do.

Successful implementation of the proposed AI-based DSS framework to current HE management systems and processes involves a thorough consideration, cooperation support and development. Of course institutions will need to ensure that the framework fits with their current data infrastructure, decision-making workflows and governance system. The

organization can do it by providing proper training for the stakeholders, update existing policies & develop a data-driven culture to implement AI-enhanced DSS to make a better decision in effective and efficient. The integration improves both the processes at institutions and the intuition of higher education leaders as they face an increasingly complex environment in which to run their educational establishments.

Results

The study's comprehensive analysis of AI-driven decision-making systems in higher education institutions presents a multi-dimensional understanding of how artificial intelligence influences administrative effectiveness. Drawing upon descriptive statistics, correlation, regression, and ANOVA analyses, as well as algorithm validation, the findings offer critical insights into institutional readiness, performance efficiency, and ethical governance in AI adoption.

The descriptive statistics provided an overview of how institutions perceive their AI integration, data quality, and administrator training. AI integration showed a moderately high mean of 3.8 (on a 5-point scale), with a median of 4, suggesting that most institutions are beyond the early stages of AI implementation. The low standard deviation (0.9) indicates consistency among institutions in adopting AI technologies, with some institutions at the forefront (maximum = 5) and others just beginning (minimum = 1). Data quality received the highest average rating (mean = 4.2), signaling that many institutions are confident in the accuracy, completeness, and reliability of their data. However, a slightly higher standard deviation of 1.1 implies variability in data management practices. Administrator training received a more moderate mean of 3.5, indicating a need for improvement in AI literacy and competency development among decision-makers.

Table 4.1
Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
AI Integration Level	3.8	4	0.9	1	5
Data Quality	4.2	4	1.1	2	5
Administrator Training	3.5	3	1.0	1	5

The correlation analysis confirmed that all independent variables — AI integration, data quality, and administrator training — are significantly and positively related to decision-making effectiveness. AI integration demonstrated a strong positive correlation ($r = 0.67$, $p < 0.01$), validating the hypothesis that institutions with greater AI deployment achieve more effective decisions. Administrator training also correlated positively ($r = 0.59$, $p < 0.05$), affirming that well-trained staff can leverage AI tools more confidently and accurately. Data quality exhibited the strongest correlation ($r = 0.72$, $p < 0.01$), highlighting its foundational role in supporting robust AI analytics and dependable decision support.

The regression analysis further substantiated these relationships. A multiple regression model explained 68% of the variance in decision-making effectiveness ($R^2 = 0.68$, $F = 12.87$, $p < 0.01$), showcasing the strong collective influence of AI integration, training, and data quality. Among the predictors, data quality emerged as the most influential ($\beta = 0.55$, $p < 0.01$), followed by AI integration ($\beta = 0.48$, $p < 0.01$), and administrator training ($\beta = 0.32$, $p < 0.05$). Additionally, ethical dimensions—transparency and accountability—were found to significantly impact

effectiveness (β = 0.41, p < 0.05), suggesting that clear AI governance not only builds trust but also improves outcomes.

The ANOVA results shed light on variability across different institutional types and functions. AI adoption was significantly higher in financial planning and enrollment management departments—areas where AI can automate and optimize structured tasks like budgeting, forecasting, and student tracking. Academic domains like faculty recruitment and curriculum planning lagged behind in AI integration. Furthermore, private institutions reported better data availability and accessibility than public institutions, likely due to more flexible resource allocation and modern infrastructure. Institutions with well-defined ethical guidelines reported significantly higher stakeholder trust, reinforcing the link between transparency and user confidence in AI.

Table 4.2

Algorithm Performance and Validation

Algorithm	Prediction Accuracy (%)	Operational Efficiency Improvement (%)	Bias Mitigation Score (0–1)	Fairness Enhancement Score (0–1)
ROA	85.3	18.5	0.78	0.82
SSPA	90.1	22.3	0.85	0.88
BMA	87.6	20.1	0.81	0.84

The algorithm performance evaluation compared three AI models—ROA, SSPA, and BMA—across key dimensions: prediction accuracy, efficiency improvement, bias mitigation, and fairness. The SSPA algorithm consistently outperformed others, with the highest prediction accuracy (90.1%), most improved operational efficiency (22.3%), and top scores for both bias mitigation (0.85) and fairness enhancement (0.88). This makes SSPA the most robust and ethical choice for institutions prioritizing equity, efficiency, and reliability in decision-making. While BMA also performed well, ROA lagged slightly, though it still showed adequate performance metrics for institutions with limited operational demands.

The key findings from the study validate the proposed hypotheses: institutions with strong AI integration, high-quality data systems, trained administrators, and ethical oversight experience significantly better decision outcomes. These insights echo broader academic consensus that AI is not only a technological asset but also an ethical and strategic priority in institutional governance. Notably, the research found that explainable AI frameworks and stakeholder participation enhance trust and system adoption—critical for long-term AI success.

Despite these promising results, the study acknowledges limitations including response biases, representativeness concerns, and the rapidly evolving nature of AI technologies. These constraints suggest the need for continuous evaluation, broader sampling across institutional types, and mixed-methods approaches for future research.

Conclusion
The study confirms that the integration of AI into institutional decision-making significantly improves administrative efficiency, accuracy, and transparency. High-quality data and administrator training are not just complementary components but essential drivers of

effective AI utilization. Institutions that have invested in structured training programs, reliable data systems, and ethical AI governance frameworks exhibit the strongest outcomes in decision-making performance and stakeholder trust. The comparative evaluation of algorithms further reinforces that selecting the right AI model—such as SSPA—can substantially enhance operational efficiency and fairness.

However, the study also reveals persistent challenges, particularly for smaller institutions with limited resources, outdated infrastructures, and fragmented data management practices. The findings underscore the need for inclusive policies, cross-functional collaboration, and targeted investments to bridge the technological gap. By implementing strategic training, adopting transparent governance practices, and deploying efficient AI algorithms, institutions can future-proof their decision-making processes and drive sustainable innovation in education administration.

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