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[Alkawati Magadum, Monica Goud](#)

MIT-ADT University college of management  
and computer Applications Loni Kalbore, Sri  
Balaji University Pune

# AI-Based Decision Support Systems for Strategic Management in Higher Education Institutions

<sup>1</sup>Alkawati Magadum, Associate Professor, HOD MCA Department, MIT-ADT University college of management and computer Applications Loni Kalbore. Pune, Maharashtra, India. [alkawati.magadum@mituniversity.edu.in](mailto:alkawati.magadum@mituniversity.edu.in)

<sup>2</sup>Monica Goud, Sr Assistant Professor, School of Commerce and Management, Sri Balaji University Pune, Maharashtra India. [gaudmonica@gmail.com](mailto:gaudmonica@gmail.com)

## Abstract

AI-based Decision Support Systems (DSS) have emerged as transformative tools in the strategic management of higher education institutions, enhancing operational efficiency and enabling data-driven decision-making. These systems leverage advanced technologies such as machine learning, big data analytics, and cloud computing to provide insights into key institutional functions, ranging from student enrollment and curriculum design to resource allocation and faculty management. Despite the potential of AI-driven DSS to reshape educational landscapes, several challenges remain in their implementation, including ethical concerns, data privacy issues, and regulatory compliance. This chapter explores the applications, benefits, and obstacles associated with AI-based DSS in higher education, emphasizing their role in forecasting trends, anticipating challenges, and improving decision-making processes. The integration of AI into institutional strategic planning is discussed, alongside the ethical and governance frameworks necessary to ensure responsible AI deployment. Case studies and real-world implementations across different regions highlight the lessons learned, offering valuable insights for universities seeking to adopt AI solutions. By addressing policy and regulatory challenges, this chapter provides a comprehensive overview of how AI can support institutional growth and academic excellence while maintaining fairness, transparency, and accountability.

Keywords: AI-based Decision Support Systems, Strategic Management, Higher Education, Machine Learning, Data Privacy, Ethical Governance.

## Introduction

The evolving landscape of higher education presents both unique challenges and exciting opportunities for institutions worldwide [1]. To meet the demands of an increasingly complex academic environment, universities are turning to innovative technologies that can optimize decision-making processes and improve operational efficiency [2]. Among these technologies, AI-based Decision Support Systems (DSS) have gained significant prominence [3]. These systems leverage machine learning, big data analytics, and cloud computing to transform how universities manage their resources, engage with students, and develop long-term strategic goals [4]. As educational institutions seek to enhance their performance and adapt to changing societal needs,

AI-based DSS offer powerful tools for achieving these objectives. By providing actionable insights and predictive capabilities, these systems enable decision-makers to make informed, data-driven choices that can lead to more efficient and effective operations [5].

AI-based DSS are designed to analyze vast amounts of data, including student performance, demographic information, and external market trends, to provide insights that can guide institutional decisions [6]. These systems can be used in a variety of applications within higher education [7], from optimizing course offerings and improving student retention rates to streamlining administrative processes such as budget management and faculty allocation [8]. With the ability to process and interpret data in real-time, AI-based DSS allow universities to make decisions based on the most current information available [9]. This level of responsiveness is crucial in an era where universities are facing increasing pressure to demonstrate accountability, improve outcomes, and deliver value to students [10],

the adoption of these technologies in higher education is not without its challenges [11]. One of the most significant barriers is the complexity of integrating AI systems into existing institutional frameworks [13]. Many universities operate on legacy systems, which may not be compatible with modern AI technologies [13]. The need to upgrade infrastructure, train staff, and manage data from diverse sources presents logistical and financial challenges [14]. The implementation of AI-based DSS requires careful consideration of ethical concerns, such as data privacy, transparency, and fairness. As these systems become more involved in critical decision-making processes, ensuring that they are used responsibly and ethically is essential to maintaining trust among stakeholders [15].