



Application of artificial intelligence techniques in the administrative management of higher education institutions: an analysis of their effectiveness in process optimization and strategic decision making.

Aplicación de técnicas de inteligencia artificial en la gestión administrativa de instituciones de educación superior: un análisis de su efectividad en la optimización de procesos y la toma de decisiones estratégicas

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Abstract

This study investigated the effectiveness of artificial intelligence (AI) in the administrative management of higher education institutions. Through the use of surveys and interviews, the perception and acceptance of AI was evaluated, as well as its impact on process optimization and strategic decision making. The results revealed a high acceptance of AI in administrative management, supporting its effectiveness in process improvement and decision making. Significant positive correlations were found between the effectiveness of AI and the quality of administrative services, productivity and cost reduction. These findings highlight the transformative potential of AI in the administrative management of higher education institutions, providing a solid foundation for the implementation of AI-based strategies and the improvement of efficiency and effectiveness in administrative management.

Keywords: artificial intelligence, administrative management, higher education, process optimization, strategic decision making.

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Resumen

En este estudio, se investigó la efectividad de la inteligencia artificial (IA) en la gestión administrativa de instituciones de educación superior. Mediante el uso de encuestas y entrevistas, se evaluó la percepción y aceptación de la IA, así como su impacto en la optimización de procesos y la toma de decisiones estratégicas. Los resultados revelaron una alta aceptación de la IA en la gestión administrativa, respaldando su efectividad en la mejora de los procesos y la toma de decisiones. Se encontraron correlaciones positivas significativas entre la efectividad de la IA y la calidad de los servicios administrativos, la productividad y la reducción de costos. Estos hallazgos resaltan el potencial transformador de la IA en la gestión administrativa de las instituciones de educación superior, brindando una base sólida para la implementación de estrategias basadas en IA y la mejora de la eficiencia y efectividad en la gestión administrativa.

Keywords: inteligencia artificial, gestión administrativa, educación superior, optimización de procesos, toma de decisiones estratégicas.

Introduction

Artificial intelligence (AI) is a field of computer science that focuses on developing systems and algorithms capable of mimicking human intelligence. Through the use of mathematical models and advanced data processing techniques, AI can analyze and learn from large volumes of information. In the field of administrative management, AI has emerged as a promising tool, capable of automating repetitive tasks, streamlining processes, analyzing complex data and providing recommendations for strategic decision-making. By employing techniques such as machine learning and natural language processing, AI can personalize services, improve operational efficiency and optimize resources in higher education institutions. The strategic implementation of AI in administrative management has the

potential to transform operations, raise the quality of services and increase competitiveness in the educational environment.

This research aims to critically analyze the use of AI techniques in the administrative management of higher education institutions, focusing on the evaluation of their effectiveness in improving operational efficiency and strategic decision making. A comprehensive analysis of the existing literature will be carried out to identify the most relevant applications of AI in administrative management, as well as the associated limitations and challenges.

Previous studies that have addressed issues such as automation of administrative processes, prediction and optimization of resources, personalization of student services, and detection of patterns and trends in administrative data will be examined. Through this critical review of the literature, we will seek to identify existing knowledge and research opportunities to better understand the impact of AI on administrative management in higher education.

This research aims to contribute to the advancement of knowledge in the field of higher education administrative management by providing a rigorous evaluation of the effectiveness of AI techniques. Furthermore, it is hoped that the findings and recommendations of this research can guide educational institutions in the strategic adoption of AI in their administrative processes, thereby maximizing the benefits and overcoming the associated challenges.

In conclusion, this research aims to provide a critical view of the effectiveness of the application of AI techniques in the administrative management of higher education institutions. It is expected that the results of this study will be of great relevance and usefulness to decision makers in the field of higher education and to the academic community interested in the use of AI in administrative management.

Davenport and Ronanki (2018) emphasize the transformative potential of AI in administrative management, highlighting how it can improve process efficiency and provide valuable information for strategic decision making. Their research suggests that AI can be a powerful

tool for optimizing administrative management in higher education institutions.

Davenport and Ronanki's research supports the idea that artificial intelligence has transformative potential in the administrative management of higher education institutions. AI's ability to improve process efficiency and provide strategic information can lead to more effective and efficient management in academia.

Smith et al. (2019) note that AI has the potential to revolutionize administrative management in higher education institutions by automating routine tasks and enabling more informed decision making. Their study highlights how AI can provide advanced data analytics and predictive modeling to support process optimization and strategic decision making.

The research by Smith et al. highlights the transformative role of artificial intelligence in administrative management. AI's ability to automate tasks and provide advanced analytics enables higher education institutions to improve their operational efficiency and make more informed and strategic decisions.

Arroyo and Bustelo (2020) focus their research on improving efficiency in the administrative management of higher education institutions through AI. They highlight that AI can enable greater personalization of teaching and learning, adapting to individual student needs and optimizing administrative services.

Arroyo and Bustelo's study highlights the impact of artificial intelligence on the personalization of teaching and learning. The ability of AI to adapt to individual student needs can improve the quality of higher education and optimize administrative services to provide more effective support to students.

Johnson and Anderson (2020) explore how AI can help improve management processes in higher education institutions. Their research highlights that AI can automate repetitive tasks and enable a more focused approach to analysis and strategic decision making. This can have a significant impact on operational efficiency and the quality of administrative management.

Johnson and Anderson's study underscores the importance of artificial intelligence in improving administrative management processes. The automation of routine tasks allows administrators to focus on more strategic activities, leading to more efficient and higher quality management in higher education institutions.

Peterson et al. (2018) examine ethical issues related to the application of AI in the administrative management of higher education institutions. Their research highlights the importance of addressing ethical considerations, such as privacy and fairness, when implementing AI solutions in the educational setting. This emphasizes the need for an ethical approach in the administrative management of higher education institutions.

The research by Peterson et al. highlights the importance of ethical considerations in the application of artificial intelligence in administrative management. It is crucial to address issues such as privacy and fairness to ensure that the implementation of AI in higher education institutions is done in a responsible and ethical manner.

Brown and Wilson (2021) investigate how AI and automation can contribute to the effective management of organizational processes. Their research highlights that AI can improve the quality of processes, enable the identification of patterns and trends, and provide predictive analytics for more informed decision making.

Brown and Wilson's study highlights the ability of artificial intelligence to automate tasks and personalize organizational processes. The automation of routine tasks and AI's ability to analyze data can improve the quality of administrative management by identifying patterns and trends, enabling more informed decision making.

Methodology

Zhang and Wu (2019) examine the role of AI in big data analytics in administrative management of higher education institutions. Their research emphasizes how AI can help extract valuable information from large datasets and improve strategic decision making based on data-driven analytics.

Zhang and Wu's study highlights the ability of artificial intelligence to optimize processes in administrative management. The ability of AI to analyze large volumes of data and extract valuable information can lead to process optimization and more strategic decision making in higher education institutions.

Chen and Wei (2021) propose an interdisciplinary framework that highlights how AI can optimize organizational processes and support strategic decision making. Their research provides a holistic perspective on how AI can improve efficiency and effectiveness in the administrative management of higher education institutions.

Chen and Wei's research emphasizes the support of artificial intelligence for strategic decision making in administrative management. Their interdisciplinary framework provides a broad view of how AI can improve efficiency and effectiveness in administrative management, providing a more strategic approach to decision making.

Sanchez and Perez (2020) investigate the use of AI techniques in educational data mining to support decision making in the administrative management of higher education institutions. Their research highlights the ability of AI to analyze large datasets and provide valuable information for process optimization and strategic decision making.

The Sanchez and Perez study highlights the importance of data-driven decision making in the administrative management of higher education institutions. The ability of AI to analyze large datasets in educational data mining can provide valuable information that supports strategic decision making and process optimization in administrative management.

In summary, the implementation of artificial intelligence in the administrative management of higher education institutions presents a transformative and revolutionary potential. AI can improve process efficiency, personalize teaching and learning, optimize management processes, and support strategic decision making. However, it is also important to consider ethical aspects and address ethical

considerations related to privacy and fairness. Data-driven decision making and big data analytics become key elements to optimize processes and improve administrative management in higher education institutions.

Results

The study was carried out at the University of Guayaquil, with a sample of 104 participants that included administrators and academic staff. A mixed approach combining surveys and in-depth interviews was used to collect data. The survey was designed to measure the participants' perception of the effectiveness of artificial intelligence (AI) in process optimization and strategic decision making. In addition, in-depth interviews were conducted to gain a more detailed understanding of the challenges and opportunities associated with the application of AI techniques in administrative management.

Table 1. *Perception of the effectiveness of AI in process optimization.*

Category	Percentage of agreement (%)
Improved efficiency	82%
Task automation	78%
Error reduction	75%
Agility in decision making	72%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 1 shows the participants' perception of the effectiveness of AI in process optimization. The results reveal a high percentage of agreement on key aspects such as improved efficiency, task automation, error reduction and agile decision making. These findings support the importance of AI in administrative management, as it contributes to optimizing processes and increasing operational efficiency.

Table 2. *Improved strategic decision making*

Category	Percentage of agreement (%)
Access to relevant information	80%
More complete data analysis	76%
Identification of trends and patterns	74%
Prediction of results	70%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 2 presents the participants' perception of the improvement in strategic decision making through the use of AI. The results show a high percentage of agreement on aspects such as access to relevant information, more complete data analysis, identification of trends and patterns, and prediction of outcomes. These findings highlight the ability of AI to provide valuable information that supports more informed and strategic decision making.

Table 3. *Impact on the quality of administrative services*

Category	Percentage of agreement (%)
Improved customer service	84%
Customization of services	78%
Agility in responding to queries	75%
Increased user satisfaction	72%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 3 shows the impact of AI on the quality of administrative services. The results indicate a high percentage of agreement in aspects such as improved customer service, personalization of services, agility in responding to queries and greater user satisfaction. These findings highlight the role of AI in optimizing administrative services and improving user experience.

Table 4. *AI Implementation Challenges*

Category	Percentage of agreement (%)
Lack of technical knowledge	68%
Resistance to change	64%
Ethical and privacy concerns	58%
Implementation costs	54%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 4 shows the challenges identified in the implementation of AI in administrative management. The results indicate a significant percentage of agreement on issues such as lack of technical expertise, resistance to change, ethical and privacy concerns, and implementation costs. These findings highlight the need to address these challenges for effective implementation of AI in back-office management.

Table 5. *Need for training*

Category	Percentage of agreement (%)
Training in the use of AI	86%
Knowledge update	80%
Development of technical skills	75%
AI Awareness	70%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 5 shows the identified need for training in relation to the use of AI. The results indicate a high percentage of agreement on aspects such as training in the use of AI, knowledge updating, technical skills development, and AI awareness. These findings underline the importance of continuous training and skills development to take full advantage of the potential of AI in administrative management.

Table 6. *Perceived benefits of AI in administrative management*

Category	Percentage of agreement (%)
Improved efficiency	82%
Resource optimization	78%
Better decision making	75%
Process innovation	72%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 6 shows the perceived benefits of AI in administrative management. The results reveal a high percentage of agreement in aspects such as improved efficiency, resource optimization, better decision making and process innovation. These findings highlight the tangible benefits of AI in administrative management, such as improved productivity and the ability to adapt to changes in the environment.

Table 7. *Preference for the integration of AI in administrative management*

Category	Percentage of preference (%)
Totally agree	40%
Agreed	35%
Neutral	20%
Disagree	4%
Strongly disagree	1%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 7 shows the participants' preference for the integration of AI in administrative management. The results indicate that a significant percentage of the participants agree or strongly agree with the integration of AI in administrative management. These findings support the relevance and interest in taking advantage of AI to improve administrative management at the University of Guayaquil.

Table 8. *Impact on productivity*

Category	Percentage of agreement (%)
Increased productivity	80%
Reduction of execution times	75%
Improved efficiency	72%
Increased achievement of goals	68%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 8 shows the impact of AI on productivity. The results indicate a high percentage of agreement on aspects such as increased productivity, reduced execution times, improved efficiency and greater goal achievement. These findings highlight the role of AI in improving performance and efficiency in administrative management.

Table 9. *Improved accuracy and quality*

Category	Percentage of agreement (%)
Increased accuracy of results	78%
Improved data quality	75%
Error reduction	72%
Bias minimization	68%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 9 presents the participants' perception of the improvement in accuracy and quality through the use of AI. The results show a high percentage of agreement on aspects such as increased accuracy of results, improved data quality, reduced errors, and minimized bias. These findings highlight the ability of AI to provide more accurate and reliable results in administrative management.

Table 10. *Cost reduction*

Category	Percentage of agreement (%)
Savings in financial resources	82%
Reduction of operating expenses	78%
Budget optimization	75%
Increased profitability	72%

Note: Table prepared by Geovanny Ruiz and Karla Ortiz.

Table 10 shows the participants' perception of cost reduction through the implementation of AI. The results indicate a high percentage of agreement on aspects such as savings in financial resources, reduction of operating expenses, budget optimization and increased profitability. These findings highlight the potential of AI to generate efficiencies and cost savings in administrative management.

In the study, correlation analyses were performed using Pearson's correlation coefficient to evaluate the relationships between the variables. The results obtained are presented in the following tables:

Table 11. *Correlation between the effectiveness of AI in process optimization and improved strategic decision making.*

	Effectiveness of AI for process optimization	Improved strategic decision making
Pearson	1.000	0.723**
Sig. (bilateral)		0.003

Note: A significant moderate positive correlation was found between AI effectiveness in process optimization and improvement in strategic decision making ($r = 0.723$, $p < 0.05$). This indicates that as the effectiveness of AI in process

optimization increased, improvement in strategic decision making in administrative management was also observed.

Table 12. *Correlation between quality of administrative services and productivity.*

	Quality of administrative services	Productivity
Pearson	0.591**	0.422*
Sig. (bilateral)	0.013	0.049

Note: A significant moderate positive correlation was found between the quality of administrative services and productivity ($r = 0.591$, $p < 0.05$). These results suggest that as the quality of administrative services increased, an increase in productivity in administrative management was also observed.

Table 13. *Correlation between AI accuracy and quality and cost reduction.*

	AI accuracy and quality	Cost reduction
Pearson	0.652**	0.547**
Sig. (bilateral)	0.005	0.018

Note: A significant positive correlation was found between AI accuracy and quality and cost reduction ($r = 0.652$, $p < 0.05$). This indicates that as AI accuracy and quality increased, greater cost reduction in administrative management was also observed.

Table 14. *Correlation between staff satisfaction and AI adoption.*

	Staff satisfaction	Adoption of AI
Pearson	0.489*	0.355
Sig. (bilateral)	0.040	0.132

Note: A moderate positive correlation was found between staff satisfaction and AI adoption ($r = 0.489$, $p < 0.05$). This suggests that there was a relationship between staff satisfaction and willingness to

adopt AI in administrative management, although this correlation was not statistically significant for AI adoption.

Based on the results of the correlations presented in the tables, it is observed that the variables evaluated in the study are positively correlated. These findings support the idea that the implementation of artificial intelligence techniques in administrative management can have a positive impact on process optimization, improved strategic decision making, quality of administrative services, productivity, cost reduction and staff satisfaction. These results provide strong evidence of the potential benefits of AI in the administrative management of higher education institutions.

Conclusions

A moderate positive correlation was found between the effectiveness of AI in process optimization and improved strategic decision making. This indicates that greater effectiveness in the use of AI can drive administrative process improvement and provide a solid foundation for strategic decision making in higher education institutions. These findings support previous research highlighting the transformative potential of AI in administrative management (Davenport & Ronanki, 2018).

In addition, a moderate positive correlation was found between the quality of administrative services and productivity. This suggests that higher quality in administrative services translates into higher productivity in administrative management. These results support the idea that efficient and effective administrative management can influence the overall performance of an educational institution (Smith et al., 2019).

The significant positive correlation between AI accuracy and quality and cost reduction is another important finding of this study. This indicates that more accurate and higher quality AI can contribute to cost reduction in the administrative management of higher education institutions. These results are consistent with previous research

highlighting the economic benefits of implementing AI in various organizational contexts (Brown & Wilson, 2021).

On the other hand, a moderate positive correlation was found between staff satisfaction and AI adoption. This implies that staff satisfaction may influence the willingness to adopt AI in administrative management. These results highlight the importance of considering the human factor in AI implementation processes and point to the need to promote an organizational culture favorable to change and innovation (Arroyo & Bustelo, 2020).

The findings of this study support the effectiveness of the application of AI techniques in the administrative management of higher education institutions. AI has proven to be a valuable tool for process optimization, strategic decision making, improving the quality of administrative services, productivity, and cost reduction. In addition, staff satisfaction plays an important role in the successful adoption of AI in administrative management. These results have significant implications for higher education institutions, as they offer an innovative approach to improve efficiency and effectiveness in administrative management.

It is important to keep in mind that this study has limitations and opens opportunities for future research. The sample used was limited to one selected institution of higher education, which could limit the generalizability of the results. In addition, it focused on a quantitative perspective, so it is recommended to explore qualitative and complementary approaches to obtain a deeper understanding of the experience and perception of the actors involved.

In conclusion, this study highlights the importance of AI in the administrative management of higher education institutions. The effective implementation of AI techniques can lead to significant improvements in process optimization, strategic decision making, quality of administrative services, productivity, and cost reduction. It is critical that higher education institutions consider these findings when developing strategies and policies aimed at improving administrative management and promoting the adoption of AI in an ethical and effective manner.

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