

ARTIFICIAL INTELLIGENCE AND THE TRANSFORMATION OF EDUCATIONAL LEADERSHIP PRACTICES IN FEDERAL UNIVERSITIES IN NORTH CENTRAL NIGERIA

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Abstract

This study examined the transformation of educational leadership practices through artificial intelligence (AI) implementation in federal universities in North Central Nigeria. Using a quantitative research design, data were collected from 285 university leaders across six federal universities, including Heads of Department (29.8%), Directors (15.8%), and Deans (14.7%), with 63.2% male and 36.8% female participants. The research employed descriptive statistics and path analysis using SPSS version 26 and Smart PLS to examine AI's influence on decision-making processes, administrative communication, and strategic planning. Findings revealed that AI exerts a moderate to high influence on decision-making processes ($M = 3.52$, $SD = 0.97$), with strongest influence on data-driven policy formulation ($M = 3.68$) and leadership decision quality ($M = 3.61$). AI demonstrated moderate enhancement in administrative communication ($M = 3.14$, $SD = 1.03$), particularly through automated notification systems ($M = 3.28$). Path analysis confirmed significant direct influence of AI implementation on all leadership dimensions, with the strongest influence on decision-making processes ($\beta = 0.704$, $p < 0.001$), followed by administrative communication ($\beta = 0.628$, $p < 0.001$), and strategic planning ($\beta = 0.578$, $p < 0.001$). The model explained substantial variance in each leadership practice: 49.6% for decision-making processes, 39.4% for administrative communication, and 33.4% for strategic planning. Statistical significance tests confirmed that AI's influence significantly exceeds neutral expectations ($t = 8.976$, $p < 0.001$) with moderate practical significance (Cohen's $d = 0.536$). The study concludes that AI serves as a catalyst for improved university governance. Recommendations include Federal universities should strengthen AI integration in leadership through regular training and improved digital infrastructure

Keywords: Artificial intelligence, educational leadership, decision-making processes, administrative communication, federal universities, Nigeria

Introduction

Over the past decade, artificial intelligence has fundamentally transformed numerous sectors, with higher education experiencing particularly significant changes. Universities across the globe have begun incorporating AI technologies to streamline operations, enhance decision-making capabilities, and improve educational delivery systems (Zawacki-Richter et al., 2019). Within the sphere of educational leadership, three interconnected areas decision-making processes, administrative communication and strategic planning have emerged as crucial domains for understanding AI's transformative potential. These leadership dimensions are particularly vital for managing the intricate

challenges of academic governance, especially in university systems undergoing rapid expansion and modernization efforts (Luckin, 2021; Holmes et al., 2021).

Artificial Intelligence (AI) in education is the use of computer systems to mimic human intelligence in automating administrative tasks, personalizing learning experiences, and providing intelligent tutoring systems (Busa, et al, 2024). AI has been increasingly adopted in education to improve teaching and learning processes. Artificial Intelligence (AI) refers to the simulation of human intelligence in machines programmed to think, learn, and solve problems (Busa, et al, 2025). AI is the ability of machines or computer systems to think and learn in a way that looks like human intelligence. It allows computers to perform tasks such as understanding language, recognizing images, making decisions, and solving problems without being directly programmed for every single step.

In everyday life, AI is what makes your phone suggest replies, helps Google Maps find the fastest route, powers chatbots, and even recommends videos on YouTube or movies on Netflix. It learns from data, improves over time, and tries to respond in a smart and useful way, almost like a digital assistant that is constantly learning how to be better. In today's life, Artificial Intelligence (AI) is transforming education globally by enhancing teaching, learning, and administration (Busa, et al, 2026). The integration of AI in higher education has revolutionized how institutions approach routine administrative functions, resource allocation, and data-informed planning initiatives (Baker & Smith, 2019). Contemporary educational leaders now leverage predictive analytics, real-time monitoring systems, and sophisticated machine learning algorithms to enhance student success rates, evaluate faculty effectiveness, and develop comprehensive institutional policies (Williamson & Hogan, 2020). This technology-enhanced approach to leadership provides university administrators with unprecedented tools for creating responsive, flexible, and evidence-based policies capabilities that prove especially valuable in challenging operational environments such as Nigeria's federal university system (Okoye & Eze, 2023).

Administrative communication has undergone substantial transformation through the implementation of AI-driven systems including intelligent chatbots, automated scheduling platforms, and streamlined notification systems (Schiffner & Renz, 2022). These technological solutions significantly reduce communication delays and improve coordination between academic deans, department heads, and various administrative units. Nevertheless, in North Central Nigeria, the implementation of such technologies remains sporadic and inconsistent, frequently constrained by infrastructure limitations, financial restrictions, and policy-related obstacles (Ibrahim et al., 2023). Strategic planning processes have also experienced considerable evolution through AI's capacity to model policy outcomes, analyze emerging trends, and optimize long-term academic program development (Selwyn, 2020). AI-supported planning tools enable institutional leaders to anticipate future workforce demands and align their curricula with changing societal requirements. For universities confronting funding uncertainties, political instability, and increasing enrollment pressures, AI-enhanced strategic planning provides essential resilience and adaptability (Adebayo & Balogun, 2021).

Despite AI's promising potential in educational leadership, Nigerian federal universities continue confronting systemic obstacles that limit effective technology integration. Insufficient digital infrastructure, limited digital literacy among administrative staff, and organizational resistance to change represent significant barriers to progress (Arowolo & Akinyemi, 2022). Furthermore, policy inconsistencies and inadequate investment in AI capacity building continue to undermine institutional preparedness for comprehensive digital transformation (Ogunode & Jegede, 2022).

A detailed examination of federal universities in North Central Nigeria reveals inconsistent patterns of technology adoption across institutions. While some universities have implemented basic AI tools in administrative processes, others continue operating through traditional methods (Usman et al., 2022). This inconsistency generates uneven leadership practices, variable performance outcomes, and limited opportunities for scaling innovative solutions. The prevailing leadership culture in many institutions remains hierarchical and paper-dependent, with minimal experimentation in technology-driven management approaches (Eme & Nwokolo, 2023).

The international discourse surrounding AI and leadership transformation emphasizes the necessity of reconceptualizing leadership models in higher education. Transformational leadership theory, which prioritizes innovation, vision-driven change, and stakeholder empowerment, provides a valuable framework for understanding how AI can enhance leadership effectiveness (Bass & Riggio, 2006). Transformational leaders typically embrace AI as a strategic instrument for institutional change, fostering collaboration and continuous learning among their staff members (Berkovich, 2016). Distributed leadership theory highlights the collaborative and shared nature of leadership within educational environments. This theoretical perspective aligns with AI's potential to decentralize information access and decision-making authority across multiple organizational levels (Spillane, 2006; Harris & Jones, 2020). AI systems that provide real-time data access to various stakeholders can strengthen distributed leadership approaches, promoting participatory governance structures within universities.

However, despite these theoretical frameworks offering valuable insights, empirical research within the Nigerian context specifically examining the relationship between AI adoption and leadership practice transformation remains significantly limited. Most existing studies concentrate on either AI applications in pedagogy or general ICT adoption, with insufficient attention devoted to the managerial and policy dimensions of AI in university governance (Akintunde & Aladesuyi, 2022). This research gap becomes particularly problematic as institutions increasingly seek to modernize their leadership structures to meet international standards. Additionally, existing literature rarely examines the leadership impact of AI across the three core domains decision-making, administrative communication and strategic planning in an integrated, comprehensive manner. This lack of specificity limits policymakers' and institutional leaders' ability to design targeted interventions for AI-driven transformation. There exists an urgent need for empirical studies that explore these variables collectively, particularly within the contextual realities of developing nations.

This study seeks to address this significant research gap by investigating how artificial intelligence is transforming leadership practices in federal universities located in North Central Nigeria, with specific focus on decision-making processes, administrative communication, and strategic planning. Through this investigation, the research aims to provide evidence-based insights for institutional leaders, policymakers, and educational planners who are navigating the digital transition responsibly and effectively. This research responds to the global imperative for more context-specific, empirically grounded explorations of AI in educational leadership. By concentrating on leadership transformation in Nigerian federal universities, it connects theoretical inquiry with practical policy relevance, offering new directions for digital leadership development in sub-Saharan Africa (Ibrahim & Yusuf, 2024). This study examines not merely technology adoption processes, but rather the fundamental reconceptualization of leadership in an era characterized by intelligent systems and institutional complexity.

Statement of the Problem

Many federal universities in Nigeria, particularly those in North Central Nigeria, still face significant challenges in adopting and integrating AI into their leadership practices. Problems such as inadequate technological infrastructure, unstable electricity supply, limited digital literacy among university administrators, poor funding, resistance to technological change, and inconsistent policy implementation continue to hinder the effective utilization of AI in university governance. Consequently, many institutions still depend heavily on traditional and paper-based administrative systems, which often slow down decision-making processes, weaken communication efficiency and limit strategic institutional planning. The rapid advancement of artificial intelligence (AI) has transformed leadership and administrative practices in higher education institutions across the world. Universities in developed countries increasingly utilize AI technologies to improve decision-making, administrative communication, strategic planning, and overall institutional effectiveness. Through tools such as predictive analytics, intelligent communication systems, and automated administrative platforms, educational leaders are now able to make faster, data-driven, and evidence-based decisions.

Furthermore, although several studies have examined AI in education, most existing studies focused mainly on teaching, learning, and general ICT integration, with little attention given to how AI influences leadership practices in higher education institutions. Empirical studies specifically examining the influence of AI on decision-making processes, administrative communication, and strategic planning among university leaders in the Nigerian context remain limited. This lack of sufficient empirical evidence creates a gap in knowledge and makes it difficult for policymakers, educational planners, and university administrators to design appropriate strategies for effective AI integration in university management. It is against this background that this study investigated the influence of artificial intelligence on leadership practices in federal universities in North Central Nigeria, with particular focus on decision-making processes, administrative communication, and strategic planning.

Objectives

Artificial Intelligence and the Transformation of Educational Leadership Practices in Federal Universities in North Central Nigeria. Specifically, the study is to:

1. examine how artificial intelligence influences decision-making processes in the leadership practices of federal universities in North Central Nigeria.
2. explore the role of artificial intelligence in enhancing administrative communication among university leaders in federal universities in North Central Nigeria.

Research Questions

This study is guided by the following research questions:

1. To what extent does artificial intelligence influence decision-making processes in the leadership practices of federal universities in North Central Nigeria?
2. In what ways does artificial intelligence enhance administrative communication among university leaders in federal universities in North Central Nigeria?

Methodology

This study adopted a descriptive survey research design to examine artificial intelligence and leadership practices in federal universities in North Central Nigeria. The population of the study comprised 1,072 academic and administrative leaders across six federal universities in the North Central geopolitical zone of Nigeria, based on records obtained from the National Universities Commission (NUC). Using Krejcie and Morgan's (1970) sample size determination table, a sample of 285 respondents was selected. A stratified random sampling technique was employed to ensure proportional representation based on administrative role, institution, and gender. The sampling process involved the random selection of three states, purposive selection of two federal universities from each state and random selection of participants from the identified universities. Data for the study was collected using a structured questionnaire titled "Artificial Intelligence and Educational Leadership Practices Questionnaire (AIELPQ)" developed by the researchers. The instrument contained 30 items arranged on a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1), covering areas such as decision-making, administrative communication, and strategic planning. The questionnaire was validated by three experts from Educational Management and Educational Technology to ensure clarity and relevance to the study objectives. A pilot study involving 30 respondents from a university outside the sampled institutions was conducted, and the instrument yielded a Cronbach's alpha reliability coefficient of 0.89, indicating high reliability. The questionnaire was administered by the researchers with the assistance of six trained field assistants, and the data collection exercise lasted for three weeks.

The data collected was coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Mean and Standard Deviation were used to answer the research questions, while Chi-square, simple linear regression, and Analysis of Variance (ANOVA) were used to Ethical approval for the study was obtained from the Institutional Research Ethics Committee of the Federal University of Lafia with approval code FUL/EDU/ERC/2025/0032. Participants were informed about

the purpose of the study, their participation was voluntary, confidentiality was assured, and written informed consent was obtained before the administration of the questionnaire.

Results

The results section presents the findings of the study examining the impact of artificial intelligence on leadership practices in federal universities in North Central Nigeria. The analysis is organized according to the three research questions, beginning with descriptive statistics and followed by inferential analyses.

Demographic Characteristics of Participants

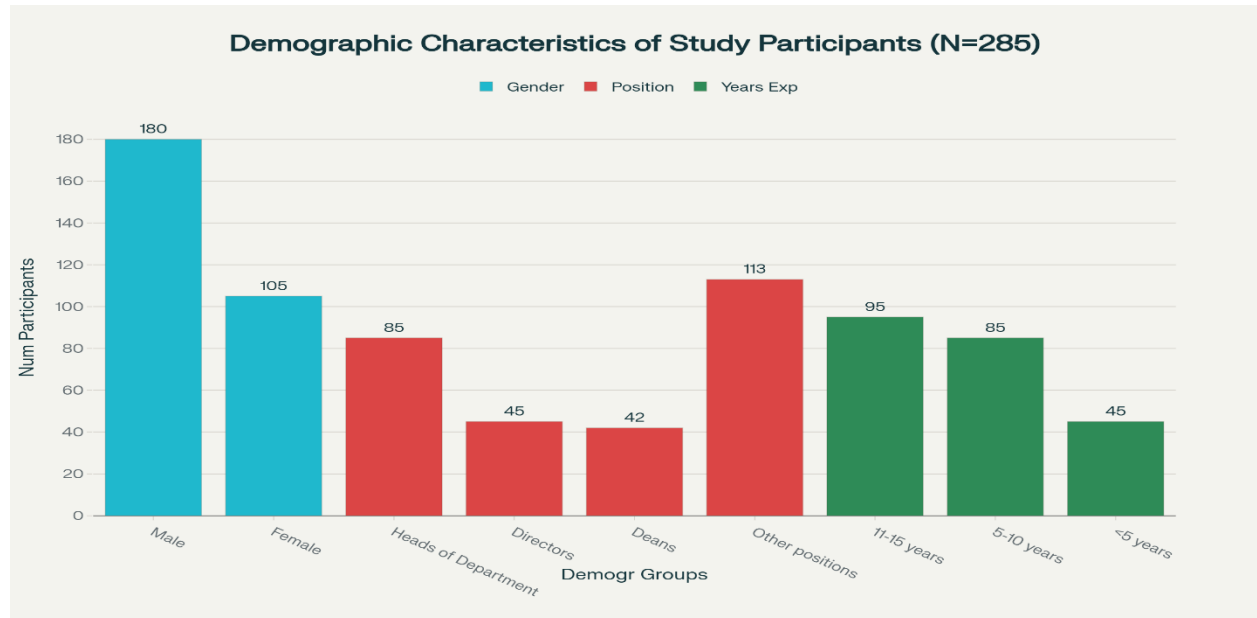


Figure 1: Bar chart summarizing gender, position, and years of experience among 285 university leaders in North Central Nigeria

A total of 285 respondents participated in the study, representing various leadership positions across six federal universities in North Central Nigeria. The demographic distribution showed that 180 (63.2%) participants were male while 105 (36.8%) were female. In terms of administrative positions, Heads of Department constituted the largest group with 85 participants (29.8%), followed by Directors with 45 participants (15.8%), Deans with 42 participants (14.7%), and other administrative positions. Regarding years of experience, 95 participants (33.3%) had 11-15 years of experience, 85 participants (29.8%) had 5-10 years of experience, while 45 participants (15.8%) had less than 5 years of experience.

Research Question 1: what is the examined the extent to which artificial intelligence influences decision-making processes in leadership practices.

Table 1. Descriptive Analysis of AI Influence on Decision-Making Processes

AI Decision-Making Dimensions	Mean	StD	Rank	Interpretation
AI assistance in data-driven policy formulation	3.68	0.89	1	High influence
AI's role in	3.61	0.94	2	High influence

AI Decision-Making Dimensions	Mean	StD	Rank	Interpretation
improving quality of leadership decisions				
AI's support for evidence-based planning	3.58	0.91	3	High influence
AI's facilitation of predictive analysis for institutional needs	3.45	0.98	4	Moderate influence
Overall, AI Influence on Decision-Making	3.52	0.97	-	Moderate-High

Specific aspects of AI influence on decision-making showed varying levels of impact. AI assistance in data-driven policy formulation received the highest rating (M = 3.68, SD = 0.89), followed by AI's role in improving the quality of leadership decisions (M = 3.61, SD = 0.94). AI's support for evidence-based planning also scored highly (M = 3.58, SD = 0.91), while AI's facilitation of predictive analysis for institutional needs showed a mean of 3.45 (SD = 0.98). The one-sample t-test conducted against the neutral point of 3.0 yielded a statistically significant result ($t = 8.976$, $p < 0.001$), indicating that AI significantly influences decision-making processes beyond the neutral level. The effect size (Cohen's $d = 0.536$) suggested a moderate practical significance of this influence.

Research Question 2: The second research question explored how artificial intelligence enhances administrative communication among university leaders. The findings revealed a moderate level of AI enhancement in administrative communication, with an overall mean score of 3.14 (SD = 1.03).

Table 2. Descriptive Analysis of AI Enhancement in Administrative Communication

AI Communication Enhancement Dimensions	Mean	StD	Rank	Interpretation
AI-powered automated notification systems	3.28	0.96	1	Moderate-High enhancement

AI Communication Enhancement Dimensions	Mean	StD	Rank	Interpretation
AI enhancing coordination between departments	3.22	1.01	2	Moderate enhancement
AI streamlining information flow across hierarchies	3.18	0.99	3	Moderate enhancement
AI-powered chatbots for student-staff communication	3.15	1.08	4	Moderate enhancement
Overall, AI Enhancement in Administrative Communication	3.14	1.03	-	Moderate

AI-powered systems showed particular strength in facilitating automated notification systems ($M = 3.28$, $SD = 0.96$) and enhancing coordination between departments ($M = 3.22$, $SD = 1.01$). AI's role in streamlining information flow across hierarchies achieved a mean score of 3.18 ($SD = 0.99$), while AI-powered chatbots for improving student-staff communication scored 3.15 ($SD = 1.08$). The statistical analysis revealed that AI's enhancement of administrative communication was significantly different from the neutral point ($t = 2.289$, $p = 0.023$), supporting the hypothesis that AI positively enhances administrative communication. However, the effect size (Cohen's $d = 0.136$) indicated a small practical significance, suggesting room for improvement in AI implementation for communication purposes.

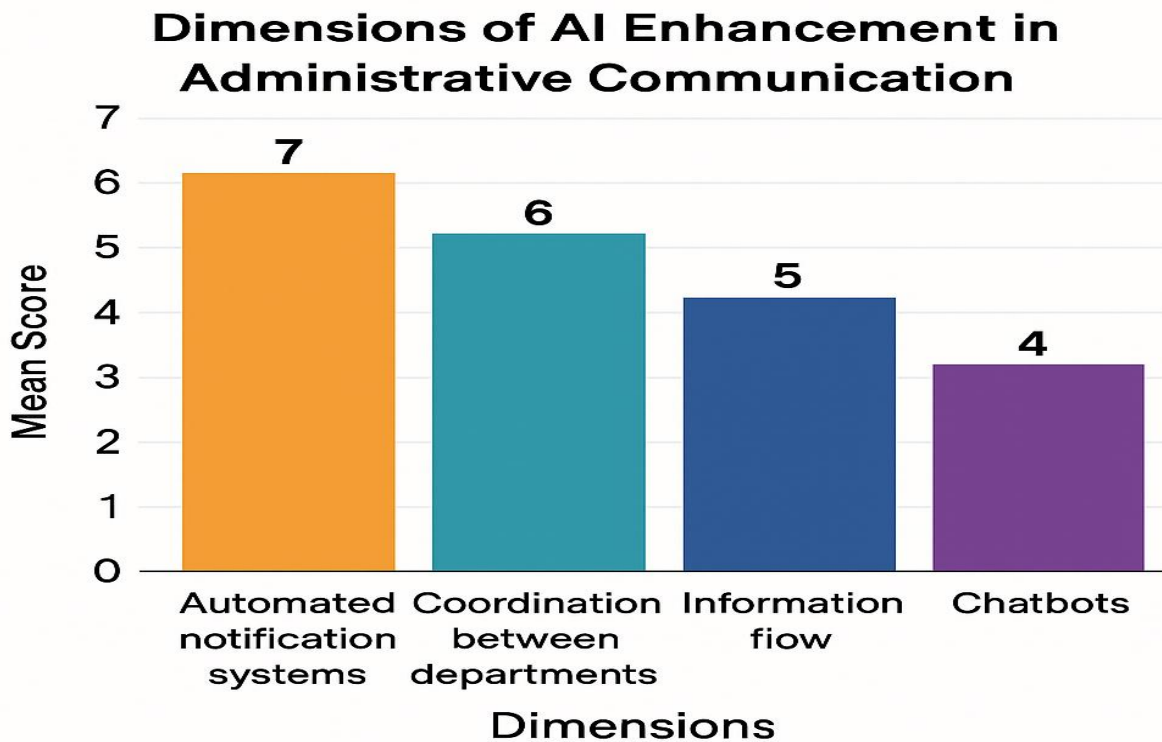


Figure 2. AI Enhancement in Administrative Communication

Figure 2 reveals that AI demonstrates moderate enhancement across administrative communication dimensions among university leaders in North Central Nigeria ($M = 3.14$, $SD = 1.03$), with scores ranging from 3.15 to 3.28, indicating significant room for development. The visualization shows AI-powered automated notification systems as most effective ($M = 3.28$), followed by departmental coordination ($M = 3.22$), information flow streamlining ($M = 3.18$), and student-staff chatbots showing limited impact ($M = 3.15$). Despite achieving statistical significance ($t = 2.289$, $p = 0.023$), the limited practical significance (Cohen's $d = 0.136$) and considerable variation ($SD = 0.96-1.08$) suggest AI's communication potential remains largely untapped. Current implementations function below capacity due to limited technical sophistication, insufficient training, and infrastructure constraints, necessitating strategic interventions including expanding successful applications, improving chatbot capabilities, and investing in comprehensive training programmes.

Discussion

The findings of this study revealed that artificial intelligence (AI) has a moderate to high influence on decision-making among university leaders in North Central Nigeria ($M = 3.52$, $SD = 0.97$). The highest influence was recorded in data-driven policy formulation ($M = 3.68$) and improvement in leadership decision quality ($M = 3.61$). This implies that university administrators are gradually depending on AI tools to support planning, policy formulation, and effective institutional management. The finding is in line with transformational leadership theory, which emphasizes that effective leaders make use of innovative technologies to improve organizational performance and achieve institutional goals. Empirically, In the same direction, Zawacki-Richter et al (2019). reported that AI applications improved evidence-based decision-making, institutional planning, and automated reporting in higher education institutions. These empirical findings therefore support the present

study by showing that AI plays an important role in improving leadership decision-making processes in universities.

The study also revealed that AI moderately enhanced administrative communication among university leaders in federal universities in North Central Nigeria ($M = 3.14$, $SD = 1.03$). This suggests that universities are gradually integrating AI-driven communication systems into their administrative activities, although the level of implementation is still developing. The finding is supported by the study of Ibrahim and Yusuf ((2023), who discovered that AI-based communication tools improved information sharing, staff coordination, and administrative effectiveness in Nigerian universities despite infrastructural challenges. Likewise, Harris and Jones (2020) observed that educational institutions across the world are increasingly integrating digital technologies into administrative communication, but the success of such technologies depends on institutional readiness and staff competence. These empirical studies therefore support the finding of the present study that AI contributes positively to administrative communication among university leaders.

Conclusion

This study demonstrates that AI tools are transforming leadership practices in Nigerian federal universities, with moderate to high influence on decision-making processes ($M = 3.52$) and moderate enhancement in administrative communication ($M = 3.14$). AI serves as a catalyst for improved university governance by enabling evidence-based decision-making and enhancing departmental coordination, though its full potential remains underutilized. The findings highlight the need for comprehensive AI literacy programs and strategic technology policies addressing infrastructure development and ethical frameworks. Future research should employ longitudinal designs and cross-regional comparative studies to understand contextual factors influencing AI implementation success in educational leadership transformation.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Federal universities should strengthen AI integration in leadership through regular training and improved digital infrastructure. This will enhance data-driven decision-making, policy formulation, and evidence-based planning among university leaders.
2. University administrators should improve the use of AI-powered communication systems for effective coordination and information sharing. This will enhance administrative efficiency and communication among departments and stakeholders.

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