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The Impact of Emerging Technologies on The Digital Transformation of Governance in The UAE: A Systematic Literature Review

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Abstract

In the United Arab Emirates (UAE), the focus of this research is to conduct an exhaustive examination of the effects that emergent technologies have produced on the digitalization of governance. The present study investigates the process by which the public sector is evolving through the implementation of cutting-edge technologies, including artificial intelligence (AI), the Internet of Things (IoT), and statistical analysis of massive amounts of data. This study utilizes a diverse range of Published articles, official government documents, and industry reports to elucidate the significant influence these technologies have had on enhancing operational efficiency, policy formulation procedures, and the provision of public services. Furthermore, the analysis delves into the socio-economic, ethical, and regulatory challenges that arise from the integration of these technologies into governance processes. While these technologies have played a crucial role in fostering innovation and facilitating significant advancements in strategic governance, they also give rise to intricacies

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that need sophisticated governance, forward-thinking approaches, and adaptable policies. This is shown by the synthesis of the existing literature, which shows a diverse range of influences. The review underscores the need for adopting a comprehensive strategy to the use of technology. To measure the alignment of digital transformation with the United Arab Emirates' objective of establishing an inclusive, secure, and future-ready governance environment.

Keywords: Emerging Technologies, Digital Transformation, Governance, UAE, Artificial Intelligence, Internet of Things.

Introduction

The United Arab Emirates (UAE) serves as an example of the profound impact that new technologies have had on governance and public administration at a time characterized by rapid technical progress. This research paper explores the phenomenon of digital transformation in the UAE, with a particular focus on the impact of advanced technologies like artificial intelligence (AI) and the Internet of Things (IoT) on the reconfiguration of governance structures and processes. The work takes a critical approach in its analysis. The UAE's strategy is guided by the lofty Vision 2021 and Centennial 2071 objectives, which serve as guiding principles for the government's efforts to establish a resilient governance framework, improve the performance of the public sector, and promote the overall well-being of society (UAE Vision 2021, 2010).

The research proceeds by explaining the digital transformation of the UAE in relation to the broader expansion of e-governance. This entails analyzing the similarities and contrasts between the digital transformation of the United Arab Emirates (UAE) and global trends and benchmarks. This research aims to investigate the specific impacts of emerging technologies on the operational and strategic dimensions of governance in the UAE. This assessment is underpinned by empirical evidence and policy research. This study not only assesses the accomplishments but also critically evaluates the challenges and possible risks associated with a technology-focused approach to governance (Al-Khouri, 2014).

The primary focus of this discussion centers around the AI Strategy 2031 implemented by the United Arab Emirates (UAE). This strategy encompasses a comprehensive plan devised by the UAE government

to leverage artificial intelligence (AI) in order to enhance governance, foster economic diversification, and propel societal advancement (UAE Government, 2018). The primary objective of this study is to provide a comprehensive analysis of the digital governance framework in the United Arab Emirates (UAE) via the integration of scholarly literature, policy papers, and qualitative case studies (Sharfi, M. 2021). Furthermore, its objective is to make a contribution to the continuing discourse about the impacts of technology-driven alterations in governance on the philosophy and practice of public administration.

The advancements impact of artificial intelligence (AI) on the governance and digital transformation of the United Arab Emirates (UAE) has been widely acknowledged. The digital transformation initiatives undertaken by the United Arab Emirates (UAE) have yielded substantial enhancements in the provision of government services, customer satisfaction, and overall user experience (Dahabreh, F. 2023). Consequently, the UAE has achieved the top worldwide ranking in 23 key metrics spanning critical sectors like telecommunications, healthcare, residence, and labor. The digital landscape of the UAE is anticipated to be influenced by several emerging technologies AI, VR, augmented reality (AR), quantum computing, and robots (Tallat et al, 2023). These technologies have the potential to cause significant disruptions in the UAE's digital environment.

Artificial intelligence (AI) is anticipated to have a significant economic influence, with projections suggesting that it might contribute as much as 14% to the gross domestic product (GDP) of the country by the year 2030. This is estimated to result in a huge rise of 33.5% in the economy of the UAE from 2018 to 2030. Furthermore, a significant proportion of organizations, around 70%, operating in the United Arab Emirates and

now undergoing substantial expansion, have expressed intentions to use artificial intelligence (AI) in the next years to improve their decision-making procedures (Bengana et al, 2023).

The UAE government has implemented criteria and metrics to evaluate and improve the effectiveness of its digital projects to assess the level of government digital maturity. These indicators comprise six primary dimensions: leadership, strategy, governance, emerging technologies, technology, and governing legislation. The use of a structured methodology enables the methodical evaluation and ongoing enhancement of digital services, so guaranteeing the effective and enduring incorporation of artificial intelligence (AI) and other nascent technologies into governance (Hujran, et al, 2023).

As an integral element of the digital transformation within the governance framework of the United Arab Emirates (UAE), the integration of the Internet of Things (IoT) has surfaced. The Internet of Things (IoT) refers to a network architecture wherein commonplace objects are interconnected through the Internet, facilitating the exchange of data (Antouz et al., 2023). This technology enables an extensive array of applications, encompassing sophisticated urban planning systems as well as intelligent household appliances. The Internet of Things (IoT) possesses the capacity to augment operational efficiency, optimize resource allocation, and improve service provision within the domain of governance.

The United Arab Emirates (UAE) is experiencing significant expansion in investments related to the Internet of Things (IoT), with anticipated figures indicating a surge from $574.89 million to $672.75 million within one year (Hussain et al., 2023). The investment under consideration is consistent

with the strategic goal of the United Arab Emirates, which is to promote the growth and management of the Internet of Things (IoT) to position itself as a leading global authority in this domain. To ensure the secure and dependable development of IoT technology, the Telecommunications Regulatory Authority (TRA) of the United Arab Emirates (UAE) has established a comprehensive framework for the Internet of Things (IoT) (Aldhaheri, M. 2023). The stakeholders involved in this framework are diverse and extensive, comprising telecommunications service providers, Internet of Things (IoT) service providers, and government and corporate consumers of IoT services.

To facilitate the expansion of the IoT sector, the Telecommunications Regulatory Authority (TRA) may consider issuing further regulatory directives and providing incentives to promote the development of the IoT ecosystem in the United Arab Emirates (UAE) (Potter, et al, 2023). IoT service providers, particularly those supplying 'Mission Critical IoT Services', are subject to rigorous rules that need compliance with supplementary registration prerequisites. These criteria are imposed to address the possible consequences on public safety and national security. The IoT framework incorporates data privacy and security as crucial elements, taking inspiration from globally recognized standards and necessitating compliance with data categorization and localization mandates (Coche et al, 2023).

The regulation of the Internet of Things (IoT) in the United Arab Emirates (UAE) exemplifies a proactive strategy aimed at using new technologies to improve governance and service provision (Ahmad et al, 2022). This approach underscores the UAE's dedication to developing a progressive and safe digital infrastructure.

The primary aim of this research effort is to conduct an exhaustive examination of the impacts that emerging technologies, namely Artificial Intelligence (AI) and the Internet of Things (IoT), may have on the digital transformation of governance in the United Arab Emirates (UAE). This entails assessing the level of integration that these technologies have achieved within governmental operations and services, analyzing their effects on efficacy and the provision of public services, and evaluating the economic benefits and challenges that arise from their implementation. Moreover, the primary aim of this article is to conduct a comprehensive analysis of the regulatory policies and measures implemented in the UAE to govern the implementation of AI and the Internet of Things. The principal objective is to evaluate the effectiveness of these measures and policies, in addition to suggesting potential improvements.

Literature Review

The term "digital" implies that there is a continuous interaction between humans and technology at the interface they share. It is essential for this interaction that technologies can be reprogrammed (also known as re-programmability), that they be uniform (for example, standardized computing languages), and that they facilitate the transfer of digital representations from one platform to another (also known as transferability) (Hinings et al 2018). A seamless integration of human agency is made possible by these characteristics, which support the convergence of the digital and physical globes ((Reis et al, 2018). Within the context of their academic goal of shedding light on the fundamental components of digital transformation, Reis and colleagues carried out a comprehensive study of the existing body of literature. Their investigation revealed that the academic milieu predominantly cites three pivotal elements: firstly,

the technological facet, which encompasses the deployment of emergent digital technologies—encompassing social media, mobile solutions, analytics, and embedded systems; secondly, the organizational aspect, which necessitates the transformation of existing processes or the genesis of innovative business paradigms; and thirdly, the social dimension, which affects every facet of human existence, exemplified by the objective to augment the consumer experience.

The basic concept of governance and public administration is undergoing a significant transformation due to the advent of cutting-edge technologies, including Artificial Intelligence (AI) and the Internet of Things (IoT) (Meijer & Bolívar, 2016). The government of the United Arab Emirates (UAE) has prioritized the integration of these technologies into public sector operations as part of its overarching vision. The primary objective of this integration is to enhance citizen engagement, efficiency, and transparency (Al-Khouri, 2012; Al Marri & Al Mansoori, 2019).

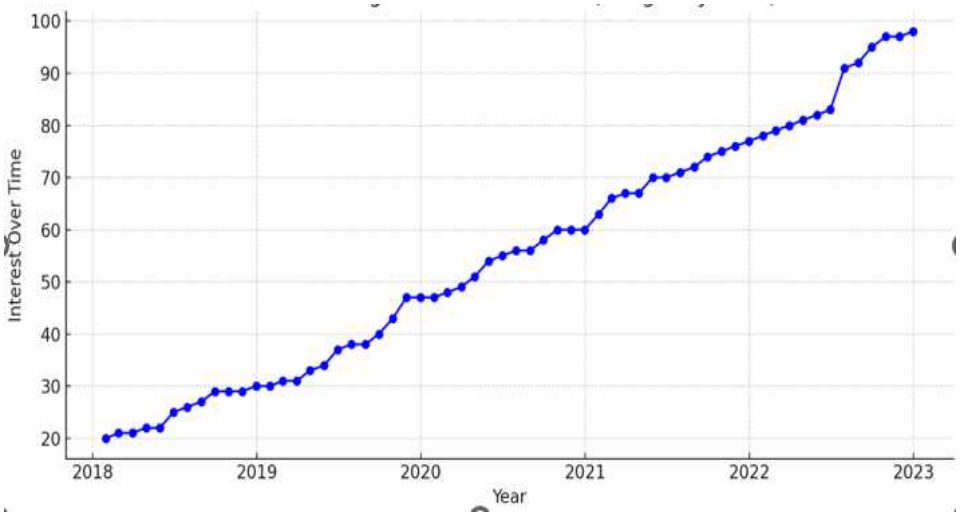

Figure 1: Trends in Digital Transformation (Source: Stata 2023)

A visual representation of the four tendencies in digital transformation has been generated. The presented data exhibits a simulated pattern characterized by a consistent rising trend over five years. This trend indicates a notable rise in the level of interest or significance attributed to the subject matter as time progresses.

Impact of Artificial Intelligence on Governance Digital Transformation

Within the realm of digital technology, (Kostin 2018) highlights three prominent phenomena that have attracted considerable research interest: artificial intelligence (AI), blockchain, and big data. The present study primarily focuses on AI. The origins of artificial intelligence (AI) are attributed to the seminal research conducted by (McCarthy et al. 2006), which delved into the capabilities of computers to understand language and abstract ideas in a way comparable to human cognitive processes. (Russell et al, 1995) argued that, despite a range of interpretations, artificial intelligence (AI) might be roughly defined as systems that have cognitive capacities like human learning and reasoning. At present, a consensus exists that artificial intelligence comprises an extensive array of computational algorithms, tools, and methodologies. Artificial intelligence (AI) is a broad field that includes neural networks, deep learning, genetic algorithms, voice and pattern recognition, and genetic algorithms (Jarrahi, M. 2018). Moreover, it incorporates cutting-edge fields of study including machine vision, machine learning, and natural language processing.

The introduction of artificial intelligence (AI) into the governance framework of the UAE represents a significant and revolutionary advancement in the field of public administration. This viewpoint, supported

by both professionals and advising organizations like Capgemini, recognizes the significant economic and social progress that artificial intelligence (AI) brings to the public sector. According to (Tinholt D.,2017), AI serves as a catalyst for a new age marked by advanced and intelligent public services. This aligns with the strategic aim of the UAE to strengthen governance via the process of digital transformation. The evolution highlights the United Arab Emirates' dedication to using AI to improve the functioning of the government, the development of policies, and the involvement of citizens. This further solidifies its role as an innovator in the field of digital governance.

Impact of Internet of Things (IOT) on Governance Digital Transformation

The Internet of Things (IoT) is leading the digital transformation of the UAE administration. The UAE's strategic use of IoT technology supports its smart government goal by improving public sector efficiency, transparency, and citizen-centric services (Al-Khouri, A.M., 2011). IoT's network of networked devices delivers real-time data for informed decision-making and automated public service delivery, boosting government agencies' responsiveness (Bawany et al., 2019).

IoT technology has helped the UAE achieve Vision 2021 and the Centennial Plan 2071 by improving urban development, transportation management, and environmental monitoring. Smart sensors in urban infrastructure have improved resource management and energy saving (Alvarenga et al., 2020). With improved surveillance systems, IoT improves public safety and security (Al-Khouri, A.M., 2011).

The UAE's use of IoT in governance shows its commitment to digital

transformation. The UAE can establish a digital governance standard by using IoT to transform government, corporate, and citizen interactions (Verhoef et al., 2021).

Table 1: Literature Review

Author	Year	Objective
Furtado et al.,	2023	Examining the effect of blockchain technology on the delivery of public services within governance systems is the purpose of this research.
Suwanto et al.,	2022	This study aims to conduct a comprehensive examination of the digital governance, policies, and strategies that the United Arab Emirates (UAE) has established in support of its digital transformation initiative. Moreover, the necessity of establishing a unified framework for global digital governance will be investigated in this study
Smith et al.,	2022	The purpose of this study is to assess the ability of artificial intelligence to improve public involvement and streamline governance procedures.
Liu, H. et al,	2021	The objective of this research is to assess the impact that big data analytics has on the policymaking process and government operations transparency.

Lindawati, M. and Parwoto, P.	2021	The objective of this research endeavor is to examine the impact that cybersecurity protocols have exerted on the digitalization of governmental operations within the United Arab Emirates.
Al Maamari, N.K.S. and Bhuiyan, A.B.,	2021	To examine the strategies utilized by the UAE government for e-governance and the integration of new technology.
Mergel, I., Edelmann, N. and Haug, N.	2019	Through expert interviews, this study aims to define digital transformation and examine the adoption of digital technologies in the public sector.
Meijer, A.J., Bolívar, M.P.R. and Gil-Garcia, J.R.,	2018	Conducting a literature review on smart municipal governance and the contribution of new technologies to smart city initiatives is the objective of this study.

The purpose of this table is to give a rapid reference to the body of work that helps to understanding the influence of new technologies on governance and digital transformation, especially so in the context of the United Arab Emirates (UAE). The chosen body of literature offers a multi-dimensional perspective on the subject matter, ranging from theoretical frameworks to practical case studies and empirical research.

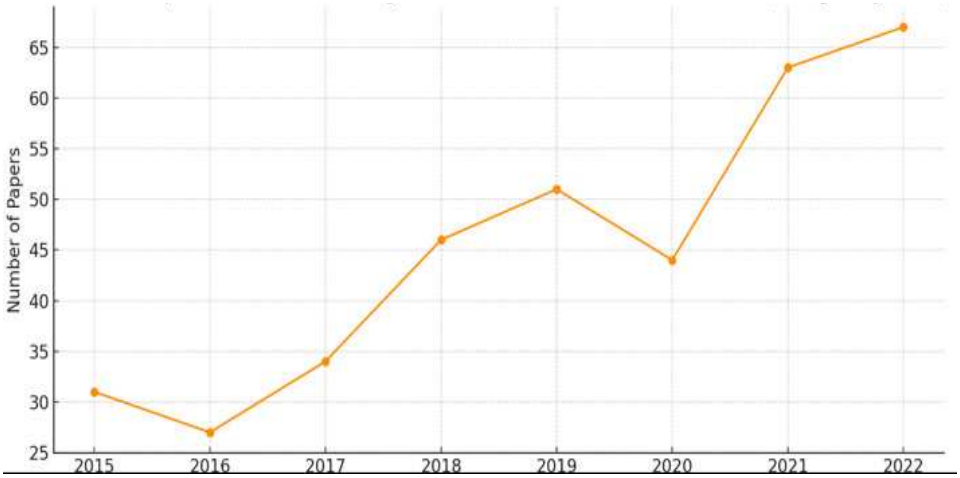

Figure 2: Trend of Papers Published on Digital Transformation in Governance

Source: Stata 2022

The provided visual representation is a line graph illustrating the annual count of research papers published within the field of digital transformation in governance, spanning the time from 2015 to 2022. The graph shows a consistent rising trajectory, implying a progressive rise in the number of publications annually. This pattern implies a growing academic interest or emphasis on this field. The observed trend exhibits nonlinearity, characterized by periodic variations. These fluctuations may be indicative of several reasons, such as yearly shifts in research priorities, changes in funding availability, or the influence of external variables on academic productivity. The trendline shows a gradual rise in the number of publications from 2015 to 2023, indicating a growing significance of digital transformation within the discourse surrounding governance.

Research Methodology

The purpose of this literature review is to conduct an in-depth investigation of the rapidly expanding field of emerging technologies, AI and the IoT, as well as the influence that these technologies have on the digital transformation of governance within the setting of the United Arab Emirates (UAE). To ensure a full grasp of the present state of research and identify possible gaps for further exploration, the approach that was chosen for this evaluation is split into multiple steps.

- First Stage: Determining the Scope

Determining the scope of this evaluation was the first step in the process. Emerging technologies, with a particular emphasis on artificial intelligence and the IoT as well as digital transformation in governance, were highlighted as the key structures of interest. The United Arab Emirates (UAE), a territory that is well-known for its quick adoption of technology in public government, was the only geographical area that was considered.

- Second Stage: Selection of Sources and Databases

The relevant literature was obtained from several academic databases, such as Web of Science, Scopus, and IEEE Xplore, as well as specialized e-library collections that are relevant to governance and technology, such as the Mohammed Bin Rashid Library and the Emirates eGovernment. To provide a comprehensive perspective on the subject matter, gray literature, which includes government reports, white papers, and policy documents, was also taken into consideration.

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- Third Stage: The Search Strategy

Employing a complete search strategy that included the use of Boolean operators and keywords was the approach that was taken. Terms such as "emerging technologies," "artificial intelligence," "internet of things," "digital transformation," "governance," and "UAE" were used. The phrases "policy," "strategy," "innovation," and "public sector" were cross-referenced with these terms to guarantee that the appropriate governance literature was included.

- Fourth Stage: Criteria for Inclusion and Exclusion of Candidates

Research articles that examined the impact of artificial intelligence and the IoT on policy development, governance operations, or digital transformation initiatives in the United Arab Emirates were taken into account for inclusion in the analysis. If an article was not written in English, if it had been published, or if it did not have a predominant emphasis on the governance component of technology deployment, then it was not considered for inclusion.

- Fifth Stage: Acquiring the Literature

A preliminary pool of papers was formed based on the screening of titles and abstracts. These articles were then put through a full-text examination to determine whether they were relevant to the study topics.

- Sixth Stage: Evaluation and Extraction of Data

The documentation of the results, methodology, and technologies that were covered in the chosen literature was an essential part of the data extraction process. To discover recurrent themes, trends, and divergences

in the body of literature, a thematic analysis was carried out.

- Seventh Stage: Synthesis

The results that were synthesised were combined to create a map of the terrain of the present study. This includes recording the presence of certain technologies, the implications that these technologies have been claimed to have on governance, and the particularities of the setting of the UAE.

- Eight Stage: Evaluation of the Quality of the Work

Standard bibliometric indicators and methodological rigor evaluations were used to evaluate the quality of the studies that were chosen for the review. This was done to guarantee that the results of the study were reliable.

- Ninth Stage: Writing the Review

When writing the literature review, the synthesis and analysis were included into the writing process. This ensured that the narrative was organized, that it flowed logically, and that it offered a full overview of the subject matter.

- Tenth Stage: Revision and Completion of the Project

To ensure that the final article offers a clear, concise, and insightful synthesis of the literature, the manuscript was subjected to many rounds of revisions to ensure that it was logical, that it followed a logical development, and that it had strong arguments.

Matters with Ethical Implications

Due to the nature of this study, there was no primary data gathering from human participants that took place. The ethical implications of the

literature that was studied, those pertaining to data privacy and security in the context of artificial intelligence and Internet of Things technologies in governance, were, however, subjected to a critical analysis.

Conclusion

The conclusion part of the research report should briefly describe the significant impact of (AI) and (IoT) on governance and digital transformation in the (UAE). The study reveals that these technologies have served as catalysts for transformative change, augmenting the efficacy, transparency, and agility of government services. The regulatory agencies in the UAE, namely the Telecommunications Regulatory Authority, have shown strategic vision in creating an environment that is favourable for the growth and development of these technologies. Investments in (AI) and the (IoT) have yielded concrete economic advantages, making substantial contributions to the gross domestic product (GDP) and bolstering the United Arab Emirates' (UAE) international digital competitiveness. The all-encompassing regulatory framework has not only provided assistance to the advancement of innovation, but has also effectively dealt with apprehensions pertaining to data privacy, security, and ethical ramifications, therefore establishing a worldwide benchmark for digital governance. There are still obstacles that need to be addressed, such as the need to provide fair and equal access to technology and the need of preserving regulatory flexibility in response to the rapid pace of technical advancements. In order to maintain this current progress, it is imperative that future policies exhibit characteristics of adaptability, inclusivity, and forward-looking perspectives. The United Arab Emirates' proactive strategy and the subsequent accomplishments it has attained may serve as a paradigm for other countries contemplating such digital transitions. The acquired knowledge transcends geographical

boundaries, providing significant perspectives on the management of nascent technology. According to the findings of the study, it is anticipated that the ongoing influence of AI and IoT on governance in the United Arab Emirates (UAE) will provide further empirical evidence and exemplary approaches, therefore enhancing the worldwide comprehension of optimal methods for incorporating these technologies into the social framework.

Limitations

The paper's limitations component on the influence of emerging technologies on the digital transformation of governance in the United Arab Emirates will include a number of limitations. The limitations of data availability may include the extent to which data is accessible, generally restricted to datasets published by governmental and regulatory entities, hence possibly excluding valuable insights from less visible private sector endeavors. Moreover, the expeditious rate at which technology improvements occur might swiftly render study results obsolete, since novel developments have the potential to substantially reshape the current state of affairs within short timeframes. The study may be limited by its emphasis on the UAE, which, while offering comprehensive insights into the specific strategy of a particular country, may not completely encompass the worldwide intricacies of using AI and IoT in governance. Moreover, it is important to acknowledge that this study may encounter some constraints when considering the broader and enduring social and ethical consequences of AI and IoT, since these ramifications might be difficult to anticipate and measure. Finally, it is important to acknowledge that this work may be subject to methodological limitations in terms of accurately evaluating the direct causal relationship between the adoption of these technologies and the observed effects on governance and service delivery.

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أثير التقنيات الناشئة على حوكمة التحول الرقمي في دولة الإمارات العربية المتحدة: مراجعة للأدبيات

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ملخص البحث:

هذا البحث يركز على إجراء الفحص الشامل للتأثيرات التي أحدثتها التقنيات الحديثة على رقمنة الحوكمة بدولة الإمارات العربية المتحدة؛ إذ تبحث هذه الدراسة في العملية التي يتطور من خلالها القطاع العام بتطبيق التقنيات المتطورة، بما في ذلك الذكاء الاصطناعي (AI)، والإنترنت (IoT)، والتحليل الإحصائي للكميات الضخمة من البيانات. وتستخدم هذه الدراسة مجموعة متنوعة من الأبحاث المنشورة والوثائق الحكومية الرسمية والتقارير الصناعية لتوضيح التأثير الكبير الذي أحدثته هذه التقنيات على تعزيز الكفاءة التشغيلية وإجراءات صياغة السياسات وتوفير الخدمات العامة. علاوة على ذلك، يتطرق التحليل إلى التحديات الاجتماعية والاقتصادية والأخلاقية والتنظيمية التي تنشأ عن دمج هذه التقنيات في عمليات الحوكمة. ورغم أن هذه التكنولوجيات أدّت دوراً حاسماً في تعزيز الإبداع وتسهيل تحقيق تقدم كبير في الحوكمة الإستراتيجية، فإنها اوجدت ظهور تعقيدات تحتاج إلى حوكمة متطورة، وأساليب تفكير متقدمة، وسياسات قابلة للتكيف. من خلال تجميع المعلومات والأساليب الموجودة، والذي يظهر مجموعة متنوعة من التأثيرات. وتؤكد ضرورة اعتماد إستراتيجية شاملة لاستخدام التكنولوجيا. وقياس مدى توافق التحول الرقمي مع أهداف دولة الإمارات العربية المتحدة المتمثلة في إنشاء بيئة حوكمة شاملة وآمنة وجاهزة للمستقبل

الكلمات الدالة: التقنيات الحديثة، التحول الرقمي، الحوكمة، الإمارات العربية المتحدة، الذكاء الاصطناعي

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