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Effectiveness of Using Some Elements of Digital Transformation (Data Analytics - Cloud Computing - Financial Technology) in Information Systems for Government Institutions "Field Study at Kafr El-Sheikh University

:^a Amr Ibrahim Awed El-Shora, ^b Ayman Aboalndr Mohamed Aboalndr.

^a Assistant Professor of Computer Science and Information Systems Head of the Computer Science Department at the Higher Institute of Management and Information Technology in Kafr El-Sheikh, Egypt

^b Assistant Professor of Management Information Systems Head of the Department of Management Information Systems at the Higher Institute of Management and Information Technology in Kafr El-Sheikh, Egypt.

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*Corresponding author: Amr.alshura@himit-kfs.edu.eg

Effectiveness of Using Some Elements of Digital Transformation (Data Analytics - Cloud Computing - Financial Technology) in Information Systems for Government Institutions "Field Study at Kafr El-Sheikh University"

Amr Ibrahim Awed El-Shora

“ Assistant Professor of Computer Science and Information Systems Head of the Computer Science Department at the Higher Institute of Management and Information Technology in Kufr El-Sheikh , Egypt

Ayman Aboalndr Mohamed Aboalndr.

Assistant Professor of Management Information Systems Head of the Department of Management Information Systems at the Higher Institute of Management and Information Technology in Kafr El-Sheikh, Egypt.

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Abstract:

The research examines the effectiveness of digital transformation technologies, including data analytics, cloud computing, and financial technology, in enhancing government institutions' information systems, specifically at Kafrelsheikh University. It aims to boost efficiency and innovation in education and university research, emphasizing the importance of digital transformation for improving efficiency, transparency, and service quality in government institutions. The study proposes a framework for digital transformation, identifying challenges and opportunities while offering recommendations for improvement. The theoretical part covers concepts such as digital transformation, data analytics, cloud computing, financial technology, and information systems, with a focus on Kafrelsheikh University. It highlights the roles, benefits, and challenges of these technologies in institutional development. An exploratory study using a questionnaire was conducted among 165 participants, yielding 120 valid responses, to evaluate the adoption of digital transformation technologies at the university. Data analysis using SPSS 19.0 indicates diverse data quality and quantity at the university, with a need to improve data access, 0positive, concerns about data suitability, diversity, and access remain, along with challenges in data analysis. Cloud computing services are praised for efficiency, security, and cost-effectiveness, despite some training needs. The research recommends improving access to academic and administrative data through centralized systems, enhancing data analysis capabilities with training and advanced tools, and expanding cloud computing services with a focus on security, privacy, and productivity.

Keywords :DigitalTransformation - DataAnalytics - CloudComputing - Financial Technology - Information Systems - Government Institutions.

الملخص باللغة العربية :

تبحث الدراسة في فعالية تقنيات التحول الرقمي مثل تحليل البيانات، والحوسبة السحابية، والتكنولوجيا المالية في تحسين نظم المعلومات للمؤسسات الحكومية، وتحديدًا في جامعة كفر الشيخ. تهدف الدراسة إلى تعزيز الكفاءة والابتكار في التعليم والبحث الجامعي، مع التأكيد على أهمية التحول الرقمي لتحسين الكفاءة، والشفافية، وجودة الخدمة في المؤسسات الحكومية. تقترح الدراسة إطار عمل للتحول الرقمي، مع تحديد التحديات والفرص وتقديم توصيات للتحسين. يغطي الجزء النظري مفاهيم مثل التحول الرقمي، وتحليل البيانات، والحوسبة السحابية، والتكنولوجيا المالية، ونظم المعلومات، مع التركيز على جامعة كفر الشيخ. تسلط الدراسة الضوء على أدوار وفوائد وتحديات هذه التقنيات في تطوير المؤسسات. تم إجراء دراسة استكشافية باستخدام استبيان بين 165 مشاركاً، وأسفرت عن 120 استجابة صالحة، لتقييم تبني تقنيات التحول الرقمي في الجامعة. تشير تحليلات البيانات باستخدام SPSS 19.0 إلى تنوع جودة وكمية البيانات في الجامعة، مع الحاجة إلى تحسين الوصول إلى البيانات، ومهارات التحليل، وتنوع البيانات. بينما التقييم العام لجودة وكمية البيانات إيجابي، تظل هناك مخاوف بشأن ملاءمة وتنوع البيانات والوصول إليها، إلى جانب تحديات في تحليل البيانات. تحظى خدمات الحوسبة السحابية بالإشادة بسبب الكفاءة والأمان والتكلفة المنخفضة، رغم وجود بعض الاحتياجات التدريبية. توصي الدراسة بتحسين الوصول إلى البيانات الأكاديمية والإدارية من خلال أنظمة مركزية، وتعزيز قدرات تحليل البيانات من خلال التدريب والأدوات المتقدمة، وتوسيع استخدام خدمات الحوسبة السحابية مع التركيز على الأمان

الكلمات المفتاحية: التحول الرقمي - تحليلات البيانات - الحوسبة السحابية - التكنولوجيا المالية - نظم المعلومات - المؤسسات الحكومية.

1- Introduction:

The recent surge in digital technology has greatly affected various life aspects such as the economy, education, and government services. This research explores the effectiveness of digital transformation elements like data analytics, cloud computing, and financial technology in enhancing government institutions' efficiency and effectiveness.

Digital transformation goes beyond system updates to include redesigning work structures and service delivery methods. Data and analytics are essential for modern information systems, providing insights for informed decision-making. Government institutions use big data and analytics to understand trends, improve operations, and develop policies (Kraus et al., 2021)

.Digital transformation represents a major shift in our world interaction, using technology to improve processes and change traditional methods across sectors like business, education, and government (Van Veldhoven & Vanthienen, 2021). Digital transformation employs technologies such as artificial intelligence, cloud computing, IoT, big data analytics, and mobile applications to enhance efficiency and productivity(Omol, 2023). Key advantages of digital transformation include improving processes, reducing time and effort, increasing accuracy, and expanding access to services and resources in fields like health and education(Stoumpos, Kitsios, & Talias, 2023). Challenges of Digital Transformation: Digital transformation introduces challenges such as privacy and security concerns, unequal access to technology, job market changes, and other social and economic impacts. It significantly affects daily life and work, presenting new opportunities and challenges that need ongoing attention(Brunetti et al., 2020).Digital Transformation of Data and Analytics: This transformation involves a major shift in how data is collected, used, and analyzed, relying on digital technology to improve analytical processes and extract insights from data(Abill & Potter, 2024).Big Data Aggregation: Digital transformation facilitates the collection of large-scale data from multiple sources, creating massive data sets for trend and pattern analysis(Kaisler et al., 2013). Enhancing User Experience: Digital technology improves user experiences in online shopping, government services, and banking, enhances data analysis for better decision-making, and supports innovation through efficient idea development(Abrell et al., 2016).Role of Cloud Computing in Digital Transformation: Cloud computing provides flexible, scalable infrastructure for managing large amounts of data efficiently and securely, helping institutions improve efficiency, reduce costs, and foster innovation(Mohamed, Oluwaseyi, & Abill, 2024).Importance of Cloud Computing for Governmental Institutions: Cloud computing is crucial for digital transformation, offering scalable infrastructure for data management and enhancing collaboration among governmental departments(Mohamed, Oluwaseyi, & Abill, 2024) .Governmental institutions' adoption of cloud computing is linked to improving service quality. Financial technology (fintech) plays a crucial role in digital transformation by enhancing financial management, increasing efficiency, reducing corruption, and expanding financial inclusion(Sebele, 2023). Financial technology improves the efficiency o governmental institutions by streamlining financial processes, enhancing transparency, and increasing financial inclusion(Falaiye et al., 2024). Digital transformation in information systems fundamentally changes how information is managed, focusing on automation, AI, and data analytics to improve efficiency and decision-making. This transformation also involves developing security solutions and enhancing user experiences through new technologies and interfaces(Mihu, Pitic, & Bayraktar, 2023).Governmental institutions use digital technologies to improve services, communication, and administrative processes, creating a comprehensive digital ecosystem. Digital transformation can improve government services by developing online platforms, enhancing human resource management, and improving communication with citizens(Luna-Reyes & Gil-Garcia, 2014).Integrating data analytics, cloud computing, and fintech creates a digital ecosystem that supports government operations and enhances performance.This research provides a detailed study of digital

transformation's impact on governmental information systems, aiming to improve performance and service quality (Breidbach, Keating, & Lim, 2020). Understanding how to leverage digital technologies for managing operations in large entities like government institutions is essential for improving service delivery. Digital transformation in universities updates education delivery and management through online platforms, apps, and multimedia tools to enhance learning and services (Sarker et al., 2019). Universities are adopting digital technologies to improve education, provide online learning resources, and enhance student services and research capabilities. Digital transformation supports scientific research by offering infrastructure for accessing data, sharing results, and fostering global collaboration (Alenezi, 2023).

In general, digital transformation involves the use of technologies such as artificial intelligence and cloud computing to improve efficiency and productivity. Government institutions rely on big data to enhance operations and develop policies. Digital transformation faces challenges such as privacy, security, and unequal access to technology. It improves the user experience in various services and contributes to increased efficiency and reduced corruption. Higher education is experiencing significant changes with digital transformation, supporting scientific research and global collaboration.

1.1 Motivation:

In an era of rapid technological advancements and constant changes, digital transformation is crucial for institutions, including government entities. These organizations are under pressure to improve efficiency, transparency, and service quality for citizens. The study of digital transformation elements like data analytics, cloud computing, and financial technology in government information systems is driven by the urgent need to utilize these modern tools for necessary public sector improvements.

1. **Enhancing Operational Efficiency and Motivation:** Governments aim to boost operational efficiency and service delivery effectiveness. Advanced digital technologies, such as data analytics and cloud computing, enable governments to process large amounts of data for informed decision-making, improve internal processes, and reduce costs. Financial technology further simplifies financial and administrative tasks.
2. **Promoting Transparency and Accountability:** Increasing demands for transparency and accountability in government operations can be addressed through data analytics and cloud computing, which improve performance measurement and information sharing. Financial technology also promotes transparent public fund management and reduces corruption.
3. **Improving the Quality of Services Provided:** Citizens expect government services to be efficient and effective. Data analytics help governments understand citizen needs for better service delivery, while cloud computing provides access to services anytime and anywhere. Financial technology enhances access to digital financial services, improving citizen satisfaction.

4. Keeping Up with Technological Advancements: Governments must adapt to rapid technological changes to provide modern and efficient services. Utilizing data analytics, cloud computing, and financial technology is essential for staying innovative and achieving service excellence.
5. Achieving Sustainable Development: Digital technologies contribute to sustainable development by improving resource management, efficiency, and reducing waste. Data analytics support the creation of sustainable policies, cloud computing reduces resource consumption, and financial technology promotes financial inclusion.
6. The Need for a Comprehensive and Integrated Study: There is a knowledge gap in maximizing the benefits of digital transformation for government institutions. This study aims to analyze the effectiveness of data analytics, cloud computing, and financial technology to improve government performance and service quality.

Overall Motivation: The study is driven by the need to improve government efficiency, transparency, service quality, and sustainability while adapting to technological advancements.

1.2 -Contribution

The study provides a comprehensive analysis of the effectiveness of using data and analytics, cloud computing, and financial technology in government information systems. This analysis will help understand the impact of these technologies on improving operational efficiency, transparency, and the quality of services provided to citizens. By collecting data from multiple case studies, the study will offer deep insights into the success and failure of applying these technologies in a governmental

- 1- The study aims to develop a comprehensive framework for government institutions to adopt digital transformation, including practical strategies for data analytics, cloud computing, and financial technology.
- 2- It identifies challenges and opportunities for government institutions in digital transformation and offers recommendations to overcome obstacles and maximize technology benefits.
- 3- The study provides decision-makers with reliable data and analyses to guide government policies towards efficiency, transparency, and service improvement.
- 4- It offers practical solutions for using data analytics, cloud computing, and financial technology to enhance efficiency, transparency, and resource management in government operations.
- 5- The study provides insights on leveraging financial technology for better financial resource management, strategic planning, and reducing waste.
- 6- It supports sustainable development goals by offering technological solutions that enhance efficiency and reduce environmental impact.

7- The study presents successful models and case studies from global institutions, offering lessons for effective digital transformation.

8- It emphasizes the importance of integrating various digital technologies to promote collaboration among government entities for better service delivery.

9- The study identifies necessary skills and competencies for digital transformation and suggests training programs to build these capacities.

Overall, the study offers valuable contributions for improving government information systems, enhancing efficiency, transparency, and service quality, and supporting sustainable development and performance.

1.3 -Paper structure

1. **Introduction:** This section provides the background of the study, the significance of the topic, the main objectives of the research, and explains the motivations behind examining the effectiveness of digital transformation elements in information systems within government institutions.
2. **Literature Review:** This section offers a comprehensive review of the literature related to digital transformation in the public sector, including data and analytics, cloud computing, and financial technology. Previous studies are analyzed, and research gaps that this study aims to address are identified.
3. **Theoretical Framework:** This section explores digital transformation, data and analytics, cloud computing, financial technology, information systems, government institutions, and Kafr El-Sheikh University.
4. **Field Study:** This section outlines the field study, including the study's objectives, the nature of the study, data collection methods, questionnaire development, questionnaire design and phrasing, drafting questionnaire instructions, reviewing the questionnaire with experts, analyzing items, assessing questionnaire reliability, calculating the questionnaire duration, study sample, statistical analysis methods, and research questions.
5. **Results:** This section analyzes the collected data and presents the main research findings. The results are detailed and discussed in the context of the research objectives and questions posed.
6. **Recommendations:** This section provides practical recommendations based on the research findings. These recommendations aim to assist government institutions in adopting and implementing digital transformation effectively and efficiently.
7. **References:** This section lists all the sources and references used in preparing the study, following academic standards

2- Literature review:

In this part, I will talk about previous studies that dealt with the topic in general. This part was divided into three main axes, which are:

2.1- Studies that dealt with data and analytics in digital transformation:

This study addressed the use of digital transformation data to develop new business models and enhance current processes through analytics, prediction, and decision support. This study examines the essential advancements facilitating digital transformation, its diverse applications, and offers specific use cases. The findings are structured in a framework aimed at guiding digital transformation initiatives and identifying opportunities for innovative and adaptive business models (Roedder et al., 2016). In this study, secondary data from global reports were used to explore the link between transparency and e-government development. The study applied two transparency metrics: the Corruption Perception Index (CPI) and the Open Budget Index (OBI), analyzing their impact on the E-Government Readiness Index (EGRI). The findings indicate that both metrics have a significant relationship with e-government development, showcasing their strong predictive ability for EGRI. The final sections of this study cover data analysis, a discussion of the results, conclusions, and recommendations for future research (Iyer, 2017). This study addresses the importance of data to modern society and the challenges of managing and using data produced by individuals, companies, and governments. With technological advancements, data sources are diversifying, making it more difficult to interpret and use them effectively. Although governments produce vast amounts of data, the question remains whether this data can be integrated with technology-generated data to achieve societal benefits. Data sharing across borders adds complexity due to different laws, customs, and policies. Despite these challenges, there is a rise in big data applications in the public sector. This chapter explores these applications and the associated development challenges (Aggarwal, 2015). This study examined new opportunities to improve disaster response through data analysis in the digital transformation environment of e-government. With developments in computing, communications, and big data analytics, we are at a pivotal moment where big data tools can be used to process comprehensive information related to crises from both user-generated and public sources. Traditional. This research explores the development and future potential of big data in crisis management, examining its benefits, supporting technologies, and associated challenges (Qadir et al., 2016). The study aimed to assess the availability of digital transformation requirements in government institutions according to Vision 2030, using Al Noor Hospital in Makkah Al Mukarramah as a case study. Utilizing a descriptive analytical approach and a questionnaire, it was found that the hospital management provides adequate support for digital transformation and has strategies to turn threats into opportunities. The study recommended allocating a budget to improve electronic services and offering incentives to human resources to expedite digital transformation (Saqqat et al., 2022). The study aimed to identify the role of digital transformation in improving the accounting education environment and mitigating the impact of COVID-19. Researchers used a descriptive analytical approach, distributed a questionnaire to

Palestinian university faculty, and analyzed the results with SPSS. The study concluded that digital transformation enhances teaching methods and converts accounting courses into digital programs, recommending university restructuring and infrastructure (Rashwan & Abu Arab, 2022) .

Previous studies summarized how to use data to achieve digital transformation goals by improving operations, developing new business models, and achieving benefits in various sectors such as e-government, education, and crisis management. It also highlighted the challenges related to big data management and its integration across borders, and the importance of transparency and institutional support in achieving digital transformation goals. So The research problem lies in how to leverage data analytics to advance digital transformation by developing new business models and improving current processes across various sectors, such as e-government, education, and crisis management, while addressing challenges related to managing and integrating big data across borders to achieve societal and economic benefits.

2.2- In this part, I will talk about previous Studies examining the role of cloud computing in digital transformation include:

The research explores the potential benefits of cloud computing for the biomedical informatics community, focusing on how it can serve as a tool for sharing biomedical information. Cloud computing offers scalable resources based on actual usage, which can help reduce costs compared to traditional systems. The study argues that cloud computing can enhance data entry applications that are not I/O intensive and do not need a fully developed environment, suggesting it is a viable option for the field. Instead of comparing systems in an absolute manner, the research analyzes component technologies and alternatives (Rosenthal et al., 2009). This study examined how digital transformation affects internal audit by increasing the volume of data and automating processes. It summarizes recent research on the impact of digital transformation on the quality of internal audit and highlights how it can enhance business value and the use of cloud computing, how to benefit from it, and what are the advantages and disadvantages of its use. The study identified criteria taken from variables and results of previous research to determine the best ways to use cloud computing in... Digital transformation (Tharouma & Moussa, 2022). This study explores how cloud-based digital transformation influences ICT service providers' strategies. It highlights strategic changes and challenges associated with leveraging cloud technologies to improve business models, performance, and innovation in ICT services (Clohessy, Acton, & Morgan, 2017). The study explores the significance of digital transformation (DT) in today's digital economy and its impact on businesses, societies, and institutions. Over the past twenty years, DT research has expanded to address various aspects of these changes. The study provides a comprehensive review of the existing literature on DT through a systematic literature review and visualizes research trends using VOSviewer. It classifies the literature into three main clusters based on technological, business, and societal impacts. The study identifies several gaps in the current research and proposes future research directions that could help both government and private sectors manage and mitigate the effects of

DT(Kraus, Jones, & Roig-Tierno, 2021). The study explores the factors influencing cloud-based digital transformation in organizations through a System Dynamics Model. Positive aspects include high accessibility, cost efficiency, scalability, and enhanced security. Negative aspects involve challenges related to data security, service quality, and system integration. The study aims to develop a framework for successful cloud-based digital transformation and improve understanding of decision-making processes in this domain(Tripathi, 2023).The study "Adoption of Cloud Computing as Innovation in the Organization" explores how organizations adapt to cloud computing technologies. It reviews various case studies to analyze innovative techniques in cloud computing, examining features, delivery methods, and challenges, including cybersecurity aspects like intrusion detection. The paper also looks at future research directions in the field(Golightly et al., 2022).The study compares digital transformation in business between the USA and African countries, highlighting how advanced technologies boost efficiency in the USA while African businesses face challenges but show resilience through innovation. It provides insights into diverse digital transformation approaches across these regions. (Smith, 2024).This study examined digital transformation, driven by innovations such as cloud computing and artificial intelligence, that is reshaping how companies develop strategies. The article highlights that these technologies are driving the Fourth Industrial Revolution but also pose challenges for CEOs. Many leaders have difficulty understanding these developments and managing the diverse skill levels within their teams(Pelser & Gaffley, 2020) . The study explores how organizations leverage cloud computing for digital transformation, focusing on creating high-performance virtual machines and solving data analytics issues with Google Cloud. It uses a System Dynamics Model to identify both positive factors, such as accessibility and cost efficiency, and negative factors, like data security and integration challenges. The study develops a framework to guide successful cloud-based digital transformation and enhances understanding of the decision-making process for such transformations (Tripathi, 2023) . The study by Clohessy, Acton, and Morgan (2017) investigates the impact of cloud-based digital transformation on IT service providers, focusing on their transition from traditional to cloud models. Analyzing the experiences of 20 IT service providers using the STOF business model framework, the research uncovers challenges and opportunities in service, technology, organization, and finance, revealing significant difficulties in adapting business models to leverage cloud technologies (Clohessy, Acton, & Morgan, 2017) . This study explores digital transformation in SMEs, identifying challenges and opportunities. It discusses how digital transformation can improve competitiveness, efficiency, and market access, emphasizing the need for overcoming technological, financial, and organizational barriers(Putra, Solechan, & Hartono, 2023) .This study develops a framework for successful cloud-based digital transformation in organizations. This research contributes to the understanding of the decision-making process of cloud-based digital transformation in organizations (Tripathi, 2023) .

From the presentation of previous studies in the field of cloud computing, it is clear that the benefits and challenges of cloud computing for digital transformation across various fields, including biomedical informatics, internal auditing, and information and communications

technology services. It highlights how cloud computing can provide scalable resources, cost efficiency, and enhanced security for digital transformation while also addressing challenges such as data security, quality of service, and integration. The studies reviewed emphasize the need for effective frameworks and decision-making and The problem is how to effectively leverage cloud computing in digital transformation with challenges associated with data security, quality of services, and systems integration.

2.3-In this topic, we will review the studies that dealt with financial technology and its role in digital transformation

The study explores how financial technology can enhance financial inclusion and drive economic development in developing countries. It examines technological innovations in the financial services sector, showing how they improve access to financial services, increase transparency, and support economic growth. Through case studies, the study demonstrates how these technologies can strengthen financial infrastructure and offer new solutions for sustainable economic development. (Almomani & Alomari, 2021). The study explores how suboptimal use of financial technology increases the complexity of financial systems, leading to dysfunctional relationships and destabilizing effects. It highlights the challenge of regulating financial innovations due to their unpredictable nature and recommends strengthening cooperation between government agencies and fintech companies to develop formal rules for a reliable and secure financial sector(Shkodina, Timoshenkov, & Nashchekina, 2018).This study determined the precise definition and concept of financial technology, its importance and benefits, and the foundations of cooperation between banks and financial technology companies. It also recommended the need for development in the financial services sector, including mobile payments, money transfers, loans, fundraising, and asset management. Recently, the study predicted a rise in investment in financial technology globally, with expectations for continued growth due to its ability to disrupt traditional finance through technological advancement. It has also identified fintech services, often developed by startups, that enhance traditional financial services and can lead to important innovations in both retail and corporate banking. (Almomani & Alomari, 2021) . This study reviews how FinTech is transforming the future of banking by modernizing traditional practices. It covers FinTech's impact on customer experiences, financial inclusion, regulatory challenges, and the evolution of banking models. By exploring technologies like blockchain and AI, the study examines their effects on efficiency, effectiveness, and the creation of new banking models such as neobanks. It also discusses the balance between innovation and regulation and anticipates the future role of FinTech in reshaping job roles, business models, and the financial system(Josyula, 2021) . The study examines how financial technology impacts the performance of Nigerian banks, focusing on ATM, POS, and internet banking transactions. It finds that ATM and POS transactions positively affect bank performance, while internet banking has a negative impact. The study recommends improving the usability, security, and efficiency of fintech products, being cautious with technological investments, and ensuring proper safeguards for fintech users(Okoro et al., 2024).This study explores how the Harris-Hook algorithm, combined with FinTech, can enhance the GRU

algorithm to create an efficient digital operating system for banks. The system improves operational efficiency, risk management, and productivity, achieving an average capital adequacy of 12.97, a 0.4% annual growth rate in technological progress efficiency, and a 0.5% annual growth rate in scope efficiency, demonstrating its effectiveness in digitalizing banking operations (Fang, 2024). This research identifies cybercrime threats to the fintech sector and examines preventive cybersecurity measures through a systematic literature review. It highlights problems such as weak regulations, data theft, and intellectual property violations, and recommends stronger legislation and a robust cybersecurity framework as proactive measures. The study offers insights for academics, practitioners, and regulators but suggests that future research should explore article connections and consider different review methods (Alodhiani, 2023).

From studies review how FinTech plays a critical role in digital transformation by promoting financial inclusion, driving economic growth, modernizing banking practices, and addressing cybersecurity challenges. Studies highlight the potential of FinTech to improve financial services, increase transparency, and manage risks, while emphasizing the need for improved regulation and strategic investment. The problem of the study in studying financial technology is to enhance financial inclusion while expanding access to financial services for underserved individuals, and economic development supports improving efficiency and effectiveness in modernizing banking practices, developing new business models, dealing with security threats, and developing preventive measures to ensure the security of the financial sector.

3- Theoretical Framework:

3.1- Digital Transformation

Digital Transformation is the process of adopting and implementing digital technologies across all facets of economic and social life. This transformation encompasses a range of technologies such as cloud computing, artificial intelligence, the Internet of Things, big data analytics, and augmented reality, which collectively work to improve processes and deliver enhanced services. The importance of digital transformation lies in its ability to increase efficiency by enhancing operational performance and customer interactions, while also creating new opportunities for innovation and business development. Furthermore, it improves user experience by providing advanced services, reduces costs, and enhances risk management. The advantages of digital transformation are numerous, including increased productivity, improved service quality, accurate data access for effective analysis, and the opening of new avenues for growth and innovation. As technology evolves, the evolution of digital transformation continues with advancements such as artificial intelligence, blockchain technology, and the Internet of Things. Looking ahead, the future of digital transformation is poised to further reshape economic and social landscapes, offering new opportunities for development and transforming how businesses operate and individuals interact with services and products (Kraus et al., 2022).

3.2- Data and Analytics

Data and Analytics are fundamental components of digital transformation and play a crucial role in decision-making processes across various fields. Data refers to both organized and unorganized information collected from diverse sources such as databases, websites, social media, and internet-connected devices. This data, which consists of numbers, facts, and other information, serves as the foundation for analytics. Analytics is the process of transforming data into valuable insights through various tools and techniques, aiming to uncover patterns, trends, and relationships, forecast future behaviors, and guide strategic decisions. There are several types of analytics: descriptive analytics, which involves examining data to understand and summarize it; diagnostic analytics, which uses statistical and mathematical models to explore data relationships and trends; prescriptive analytics, which provides recommendations for effective actions based on data; predictive analytics, which forecasts future trends based on historical data; and strategic analytics, which identifies long-term opportunities and threats. Additionally, big data analytics involves analyzing vast and complex data sets using advanced techniques like machine learning to extract valuable insights. Practical uses of data and analytics are diverse, including improving operational processes, enhancing customer experiences, boosting financial performance, developing products and services, and identifying market needs and demand forecasts. Overall, data and analytics are essential for enabling organizations and governments to make informed decisions and achieve their goals more effectively and efficiently (The Critical Role Data and Analytics Plays in Your Digital Transformation, 2023).

3.3 - Cloud Computing

Cloud computing is a model for delivering technological services over the internet, utilizing a range of computational resources including processing, storage, networking, and software. This model offers significant flexibility and scalability, allowing users to adjust computing resources up or down according to their needs, which helps services adapt to fluctuations in workload and demand. Additionally, internet access enables cloud services to be used from any location with an internet connection, eliminating the need for on-site infrastructure. The pay-as-you-go model of cloud computing offers a cost-effective pricing structure where users pay for actual service usage, providing flexibility and economic efficiency. Moreover, cloud computing encompasses a variety of diverse services such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), offering different options to cater to various business requirements. However, security and privacy are major concerns, requiring effective strategies to safeguard data and services from threats. Furthermore, integration and compatibility with existing infrastructure and adherence to industry standards are essential for seamless transitions and interoperability between systems. Lastly, effective resource management and control in cloud computing involve tools for monitoring and optimizing resource use, which enhances the benefits of cloud infrastructure and improves system performance and operational cost (Hashem et al., 2014) .

3.4 - Financial Technology

Financial technology, commonly known as "fintech" (a blend of finance and technology), refers to the innovative use of technology to enhance and streamline financial services and business processes. This field has been significantly shaped by digital disruption and digital finance, where modern technological advancements and digital startups have made financial services more accessible online, leading to the growth of digital finance and the expansion of financial services through smartphones and digital platforms. Furthermore, encryption and security technologies, such as blockchain, are crucial in fintech for improving security, trust, and transparency in payment processes, financial transactions, and record-keeping systems. Another significant aspect of fintech is the application of big data analytics and artificial intelligence, where banks and financial institutions leverage these technologies to analyze large volumes of financial data, enhancing decision-making and customer service. Additionally, fintech has introduced crowdfunding and peer-to-peer lending, which offer new funding models allowing individuals and small businesses to access capital from a wide range of sources beyond traditional banking institutions. The sector also focuses on improving customer experience by providing user-friendly mobile apps, websites, and innovative customer service solutions to foster satisfaction and brand loyalty. However, the rapid advancement of technology brings regulation and legislation challenges, as fintech must navigate evolving compliance requirements and financial regulations across different regions. Finally, the digital transformation of traditional financial institutions presents challenges as these institutions strive to modernize their services, invest in technology, and update their systems to offer innovative financial experiences for their customers(Limna & Kraiwanit, 2022).

3.5- Information Systems

Information systems refer to a set of processes, technologies, and resources used to collect, store, process, transfer, and utilize data and information within specific institutions or organizations. They encompass various components, starting with system design, which involves defining the system's main goal, identifying requirements and processes to achieve this goal, and establishing the system's infrastructure and technologies. Additionally, databases play a crucial role in information systems by enabling organized and efficient data storage and management, providing easy access to and management of data. Furthermore, information systems heavily rely on computing technology, including hardware, software, networks, and applications used for data processing and transfer. Another vital aspect is information security, where institutions must protect their data from security threats like breaches, malware, and fraud. Moreover, knowledge management involves processes and tools for collecting, storing, sharing, and using knowledge and expertise within organizations to promote innovation and increase productivity. Data analysis is also integral to information systems, helping to understand trends and extract important insights from data through techniques like machine learning and big data analytics. System integration is necessary to ensure smooth data flow and information exchange between different departments and units within an organization. Lastly, information systems technologies

facilitate communication and collaboration among individuals and departments, enhancing coordination and effectiveness in daily operations (Alter, 2008).

3.6- Government Institutions

Government institutions are entities managed or overseen by the government and operate according to the policies and regulations set by the government. They encompass a wide range of sectors and activities, including education, health, social services, security, infrastructure, urban planning, and the environment. These institutions hold significant public responsibility, being tasked with meeting citizens' needs and providing public services to the community. To finance their activities, government institutions typically rely on public funding through state budgets, taxes, and fees. Moreover, they are expected to operate with transparency and accountability, being open to oversight and public scrutiny. Their duties include delivering a variety of public services such as education, healthcare, transportation, and public safety. Furthermore, government institutions collaborate with each other and share information and resources to ensure effective and smooth service delivery. However, they also face administrative challenges such as resource constraints, bureaucracy, securing funding, and political changes. To address these challenges and enhance service efficiency, updating government institutions relies on technological advancements. Lastly, these institutions play a crucial role in developing policies and legislation that govern various sectors and regulate social and economic processes in the country (United Nations, 2008).

3.7 - Kafr El-Sheikh University

Kafr El-Sheikh University is one of the well-known public universities in Egypt, located in the city of Kafr El-Sheikh, Kafr El-Sheikh Governorate, Egypt. The university was established in 2006 under Presidential Decree No. 144 of 2006 and was officially inaugurated in September 2006. Disciplines and Faculties: Kafr El-Sheikh University encompasses several faculties offering a diverse range of disciplines in various fields such as engineering, agriculture, commerce, education, science, arts, law, medicine, pharmacy, nursing, and more. Research and Development: The university places significant emphasis on scientific research, encouraging researchers to conduct studies across various disciplines and providing the necessary infrastructure to support scientific research. Development and Modernization: Kafr El-Sheikh University is constantly striving to improve the quality of education, develop academic programs, and update infrastructure to meet the needs of students and the demands of the job market. ("Kafrelsheikh University", 2023)

4- Field Study:

The field study is addressed through the following points:

4.1- Purpose of the Questionnaire:

The purpose of the questionnaire is to assess the extent to which these elements are adopted and used at Kafr El-Sheikh University as a field study. The questionnaire aims to collect the

necessary data to understand the extent of the use of these technologies in the university environment, analyze gaps and challenges that might face the adoption and implementation process, and provide appropriate recommendations to enhance the effectiveness of digital transformation elements in the university and improve the performance of its information systems.

4.2- Nature of the Questionnaire:

One of the main reasons for using social questionnaires is that they help researchers predict behavior, shed light on the validity or invalidity of existing theoretical studies, and provide researchers with different experimental fields, such as, and there are several standards used to measure questionnaires, including:

1. Self-report measures
2. Likert scale
3. Thurston scale
4. Semantic differential scale

The Likert scale is considered the most widely used, so the researcher relied on it in this study because of its many advantages, such as: the ability to distinguish, ease of application, and ease of recording and analysis. Based on a Likert scale, five answer options are provided (strongly agree – agree – neutral – disagree – strongly disagree), and the respondent is asked to put a mark (✓) next to the answer that matches his or her point of view. The number in parentheses indicates the degree of response. as in Table 1(Jaeger & Cardello, 2022) .

Table 1: Rating scale according to a five-point Likert scale

M	Response	Weighted average	General trend
1	Strongly Disagree	From 1 to 1.80	Strongly disagree
2	I do not agree	From 1.81 to 2.60	the disapproval
3	To some extent true	From 2.61 to 3.40	Neutral
4	I agree	From 3.41 to 4.20	Approval
5	I totally agree	Greater than 4.20	Strongly agree

4.3- Data Collection Method:

The researcher relied on collecting data through a questionnaire directed at the selected sample, ensuring its simplicity, clarity, and ease of understanding. This was to understand the practical application of the research problem and obtain the necessary data to test the hypotheses using statistical methods. A draft of the survey was presented to a panel of experts. Several methods can be used for data collection in a questionnaire on the effectiveness of digital transformation elements in university information systems. Among these methods are the use of electronic questionnaires: electronic questionnaires were prepared using online platforms such as Google Forms or SurveyMonkey. The questionnaires were filled out online easily and conveniently, facilitating the data collection and analysis process(Kuphanga, 2024) .

4.4- Determine the topics of the questionnaire:

In light of the many studies that focused on studying the questionnaire, the following topics were identified:

4- Data and analytics:

1 /1- The quality and quantity of data available to you at the university to support your academic and administrative operations?

1/2- Use data and analyzes in making academic or administrative decisions?

3- Cloud computing:2/1- Use cloud computing services to store data or provide computer services at the university?

2/2- Your experiences in using cloud computing? Have you faced any challenges in this regard?

3- Financial technology:

3/1- Evaluate the effectiveness of digital financial systems at Kafrelsheikh University? Does it contribute to simplifying financial operations?

3/2- Do you use electronic payment applications at the university regularly?

4.5- Objectivity of the questionnaire:

'Objectivity means two meanings: - The first: It is represented by distancing oneself from whims, personal inclinations, and personal purposes when judging situations and things. The second: It is represented by the participation of more than one person in perceiving and recording the characteristics of the phenomenon, and each of them is independent of the other, and the current measure is considered objective because the method of correction is clear. Each response to it is specified to a certain degree, and the total score that the subject obtains is the sum of the scores given on the scale items that he answered(Kabir, 2016) .

4.6 - Formulating the questionnaire statements:

The scale's 120 statements were formulated taking into account several essential guidelines to ensure their effectiveness and clarity. Firstly, the phrases were designed to be simple, clear, and easy to understand. Secondly, statements that represent facts were deliberately avoided. Additionally, specialized terminology was excluded to ensure that the words used are familiar to the target audience. Furthermore, care was taken to avoid phrases that can be interpreted in more than one way or that contain more than one idea. Lastly, all statements were made to be directly related to the subject of the scale, ensuring relevance and coherence throughout.

4.7 - Establishing questionnaire instructions:

Instructions for the scale have been developed with several key purposes in mind. Firstly, they aim to define the purpose of the questionnaire clearly. Secondly, the instructions are designed to encourage people to answer the scale honestly. Additionally, they introduce the various forms of answers that can be used in the questionnaire. Furthermore, the instructions inform the employee about the time required to complete the questionnaire. Lastly, an applied example of how to answer the questionnaire is provided to ensure proper understanding and accurate responses.

4.8 - Presenting the standard to the arbitrators (apparent honesty)

The questionnaire was presented in its initial form to a group of experts in the field of information systems, and by polling the opinions of the arbitrators, the percentage of agreement between the arbitrators was 94.3%. The poll resulted in some amendments, the most important of which are the following: reformulating some phrases, excluding some items from the questionnaire, and replacing them with Other vocabulary.

4.9 - Vocabulary analysis.

To choose statements that reflect the concept of the questionnaire, the response was evaluated with acceptance or rejection. The researcher calculated the arithmetic mean, the standard deviation, and the response rate at the intermediate point (not sure). For the statements to reflect the concept of trend, the response rate needed to be 30% or less, the average should range from 2.5 to 3.5, and the standard deviation should range from 1 to 1.5. It is clear that the terms of the scale did not exceed the permissible percentage; therefore, none of the terms related to the scale were deleted.

4.10- Calculating the stability of the scale.

The stability of the scale relates to the extent of the stability of the measurement "scores". If no change occurs in the direction of a particular person, does the measure of direction give the same ranking to him in relation to the other two in a consistent manner? If this is true, then we say that the scale is stable, and based on that, the stability of the scale was calculated. The stability of the scale was calculated. Using the Cronbach's alpha method, it was found to be 0.918, as shown in Table (2), and thus the scale is considered fairly stable.

Table 2: Calculation of Scale Reliability Using Cronbach’s Alpha (Thompson, 2024).

the hub	Statement	Number of items	Stability coefficient	Honesty coefficient
the first	1- Data and analytics: 1 /1- The quality and quantity of data available to you at the university to support your academic and administrative operations? 1/2- Use data and analyzes in making academic or administrative decisions?	40	0.912	0.936
the second	2- Cloud computing: 2/1- Use cloud computing services to store data or provide computer services at the university? 2/2- Your experiences in using cloud computing? Have you faced any challenges in this regard?	40	0.443	0.911
the third	3- Financial technology: 3/1- Evaluate the effectiveness of digital financial systems at Kafrelsheikh University? Does it contribute to simplifying financial operations? 3/2- Do you use electronic payment applications at the university regularly?	40	0.801	0.971
All variables of the questionnaire form together		120	0.918	0.968

4.11- Study sample:

The study sample consists of faculty members: A sample of faculty members can be selected from various colleges and departments at the university. The sample may include professors, lecturers and teaching assistants from various academic levels and specializations. Administrative employees: A sample of administrative employees at the university is selected, such as senior management and clerical employees and workers in various administrative services. Students: A sample of students can be selected from different academic levels, colleges, and specializations. Representing the diversity of students at the university. The sample size was 165 individuals, and as shown in Table No. (3), the valid questionnaires amounted to (120) with a response rate of 80%, which is an acceptable percentage for conducting statistical analysis.as table 3 .

Table 3: Statement of survey forms distributed and received

M	Distributed forms			Response rate	
	Categories	Spreader	Received		Unreturned
1	Data and Analytics:	65	60	5	92%
2	Cloud Computing:	65	60	5	92%
3	Fintech:	65	60	5	92%

4.12- Statistical analysis methods

After coding the data and entering it into the computer, the researcher analyzed the data contained in the survey list through the program (SPSS 19.0).

4.13 - Study Questions:

The study questions are clear in the following questions:

- 1- How effective are the main axes of digital transformation (data analysis - cloud computing - financial technology) in the information systems of government institutions?
- 2- What is the effectiveness of the elements (Data Analytics - Cloud Computing - Financial Technology) in Information Systems for Government Institutions?

2.1- Data and Analytics:

2.1.1 What is the quality and quantity of data available to you at the university to support your academic and administrative operations?

2.1.2-How effective is the use of data and analytics in making academic or administrative decisions?

2.2-Cloud Computing:

2.2.1- Do you use cloud computing services to store data or provide computer services at the university?

2.2.2-What are your experiences in using cloud computing? Have you faced any challenges in this regard?

2.3- Financial Technology:

2.3.1- How effective are digital financial systems at Kafr El-Sheikh University? Do they contribute to simplifying financial operations?

2.3.3- Are electronic payment applications used regularly at the university?

4.14 - Answering the Research Questions:

To answer the main research question, How effective are the main axes of digital transformation (data analysis - cloud computing - financial technology) in the information systems of government institutions? the researchers used the program (SPSS 19.0) to conduct a three-way analysis of variance in comparing three groups: data and analytics, cloud computing, and financial technology, to find each of:

- 1- Sum of squares (between groups - within groups - total)
- 2- Degree of freedom (between groups - within groups - mean squares (mean squares))
- 3- Average variance (between groups - and within groups)
- 4- F-test value (between groups on mean squares - within groups)
- 5- Statistical significance (Sig value)

As shown in the following three tables (4, 5, 6):

Table 4: One-way Analysis of Variance (ANOVA).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17292.289	2	8646.144	39.506	.000
Within Groups	19040.600	87	218.857		
Total	36332.889	89			

Table 4 used to compare the means of different groups to determine if there are statistically significant differences between them.

The table contains the following columns:

- Sum of Squares: Measures the amount of variation within and between groups.
- df (Degrees of Freedom): Represents the number of samples or groups being analyzed.
- Mean Square: Calculated by dividing the sum of squares by the degrees of freedom.
- F (F-test value): Calculated by dividing the square of the mean between groups by the square of the mean within groups.
- Sig. (Statistical Significance): Shows whether the differences between groups are statistically significant (in this table, a value of 0.000 indicates significant statistical significance).

Table 4 uses Scheffe test to compare the means between the three groups:

- **Mean Difference:**

- o The comparison between Data Analytics and Cloud Computing shows a mean difference of 25.06667 with statistical significance (Sig. = 0.000) which means that the difference is statistically significant.

o The comparison between Data Analytics and FinTech shows a larger difference of 32.36667 with strong statistical significance (Sig. = 0.000).

o The comparison between Cloud Computing and FinTech shows a smaller difference of 7.30000 but the statistical significance (Sig. = 0.167) is not enough to be considered statistically significant (because it is greater than 0.05).

- **95% Confidence Interval:**

o This shows the range in which the mean difference falls with 95% confidence. For example, the average difference between data analytics and cloud computing ranges from 15.5536 to 34.5798.

- **Conclusion:**

There are statistically significant differences between data analytics and both cloud computing and fintech.

The difference between cloud computing and fintech is not statistically significant, meaning that there is no significant difference between these two elements.

The range in which the difference between data analytics and cloud computing falls gives 95% confidence that the actual difference is between 15.5536 and 34.5798.

Table 5: Scheffé test

(I) Groups (J) Groups	(I) Groups (J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Data and Analytics Cloud Computing	Data and Analytics Cloud Computing	25.06667*	3.81975	.000	15.5536	34.5798
	Financial Technology	32.36667*	3.81975	.000	22.8536	41.8798
Data and Analytics Cloud Computing	Data and Analytics Cloud Computing	-25.06667*	3.81975	.000	-34.5798-	-15.5536-
	Financial Technology	7.30000	3.81975	.167	-2.2131-	16.8131
Financial Technology	Data and Analytics Cloud Computing	-32.36667*	3.81975	.000	-41.8798-	-22.8536-
	Data and Analytics Cloud Computing	-7.30000-	3.81975	.167	-16.8131-	2.2131

Scheffé test table 5 , which is one of the tests used in multiple analysis of variance to compare means between different groups after performing analysis of variance (ANOVA). Scheffé test is one of the most conservative tests, and is used to compare means while reducing the risk of obtaining false results. The table contains:

Groups (I) and (J): Represent the groups being compared. In this table, the three groups are:

- Data and Analytics
- Cloud Computing
- Financial Technology

Mean Difference (I-J): Displays the difference in the mean between the different groups (Group I and Group J).

Std. Error: Standard error of the difference in means.

Sig.: Statistical significance, where this value is used to determine whether the difference between the groups is statistically significant or not. Values that are less than 0.05 mean that the difference is statistically significant.

95% Confidence Interval: This column shows the 95% confidence interval for the difference in the means, indicating the lower bound and upper bound of the difference.

Important Notes:

Values marked with an * indicate that the difference between the means is statistically significant at the 0.05 significance level.

Statistically significant differences are seen in the comparisons between data analytics and cloud computing (Sig. = 0.000) and between data analytics and fintech (Sig. = 0.000).

In the comparison between cloud computing and fintech, the difference is not statistically significant (Sig. = 0.167).

Based on the Scheffé test table, the following conclusions can be drawn regarding the impact of digital transformation elements (data analytics, cloud computing, and fintech) on information systems in government institutions:

1. Comparison between data analytics and cloud computing:

Mean difference: 25.06667

Statistical significance (Sig.): 0.000

Range with 95% confidence: 15.5536 to 34.5798

Result: There is a large and statistically significant difference between the impact of data analytics and cloud computing on information systems. This indicates that data analytics has a significantly different impact than cloud computing.

2. Comparison between Data Analytics and FinTech:

Mean Difference: 32.36667

Statistical Significance (Sig.): 0.000

95% Confidence Range: 22.8536 to 41.8798

Result: There is a large and statistically significant difference between the impact of Data Analytics and FinTech. Which indicates that Data Analytics has a significantly different impact than FinTech.

3. Comparison between Cloud Computing and FinTech:

Mean Difference: 7.30000

Statistical Significance (Sig.): 0.167

95% Confidence Range: -2.2131 to 16.8131

Result: The difference between Cloud Computing and FinTech is not statistically significant (since Sig. is greater than 0.05). Which means that there is no significant difference between the impact of Cloud Computing and FinTech on information systems.

Abstract:

Data analytics differs significantly and statistically from cloud computing and fintech in terms of their impact on information systems.

Cloud computing and fintech do not differ significantly and statistically, which means that their impact on information systems is largely similar.

Table 6: post hoc comparisons using the subset te

group	N	Subset for alpha = 0.05	
		1	2
Financial Technology	30	122.6667	
Data and Analytics Cloud Computing	30	129.9667	
Financial Technology	30		155.0333
Sig.		.167	1.000

Table is a table of post hoc comparisons using the subset test. This table is used to determine the differences between the means of different groups after performing an analysis of variance (ANOVA), and in this table, the groups are divided into subgroups based on the statistical significance test using an alpha level = 0.05.

Groups (Groups): Represents the groups being compared (FinTech, Data Analytics, Cloud Computing).

- Financial Technology (Financial Technology).
- Data and Analytics (Data Analytics).
- Cloud Computing (Cloud Computing).

N: Represents the number of samples in each group (30 in each group).

Subset for $\alpha = 0.05$: These columns display the subgroups based on the alpha value (0.05). It shows the means of the groups that can be considered similar in impact. The groups are divided into two categories (1 and 2):

Subgroup 1: includes "FinTech" and its mean is 122.6667.

Subgroup 2: includes "Data Analytics and Cloud Computing" with a mean of 129.9667, and "FinTech" with a mean of 155.0333.

Sig. (Statistical Significance): Shows the value of statistical significance, indicating whether the differences between the means are statistically significant. In this case:

Sig. = 0.167 for group 1: This means that there is no significant difference between the groups in subgroup 1.

Sig. = 1.000 for group 2: This indicates that there is also no significant difference between the groups in subgroup 2.

Results:

Financial Technology belongs to subgroup 1, with a mean of 122.6667, which means that its influence is significantly lower than the other groups.

Data and Analytics and Cloud Computing belong to subgroup 2, with means of 129.9667 and 155.0333 respectively.

The differences between the groups are not large enough to be statistically significant, as the Sig. values appear to be insignificant (greater than 0.05).

Summary:

The table shows that the differences between the groups are not statistically significant, which means that the impact of FinTech, Data Analytics, and Cloud Computing are relatively close, except for slight differences in their means.

FinTech has a smaller impact compared to Data Analytics and Cloud Computing, but it is not significant.

It is possible to consider that the three groups are similar in their impact on information systems, based on this analysis.

To answer the second question What is the effectiveness of the elements (Data Analytics - Cloud Computing - Financial Technology) in Information Systems for Government Institutions? The researchers answered the sub-questions consisting of three axes, each axis contains two sub-questions. We will initially address the first axis, the first sub-question, and so on.

4.14.1- Data and Analysis:

4.14.1.1- What is the quality and quantity of data available to you at the university to support your academic and administrative operations?

- Is the quality and quantity of data available to you at the university to support your academic and administrative operations?	Standard Deviation	Weighted Mean
1. In your opinion, how appropriate is the amount of data available to you at the university to support your academic and administrative activities?	1.09	4.13
2. Do you find that the available data is sufficient to meet your research and academic needs at the university?	0.75	4.40
3. Do you have good quality and reliable data to use in your research and academic projects?	0.79	4.30
4. What types of data do you mainly use in your academic or administrative activity?	0.73	3.67
5. Do you think there is a need to increase the amount of data available to you at the university?	0.83	4.37
6. Do you find it difficult to access the data required to support your activities at the university?	0.74	4.38
7. Do you believe that the available data covers all areas necessary to support your academic and administrative operations?	0.81	4.24
8. Do you have difficulty understanding or analyzing the data available at the university?	0.81	4.02
9. Do you think that the available data matches your research and academic needs at the university?	0.78	3.73
10. What challenges do you face in using available data to support your activities at the university?	0.81	3.73
11. Do you think there are special needs to improve the quality of data available to you at the university?	0.63	4.07
12. Do you find that the available data helps in making strategic or planning decisions in your academic or administrative activity?	0.77	4.25

13. Do you find that the available data provides the potential for strategic or predictive analytics to support your activities at the university?	0.81	4.10
14. Do you have difficulty providing updated and reliable data to support your activities at the university?	0.75	4.09
15. What are the main sources you use to obtain data at the university?	0.73	4.02
16. Do you feel that there is a lack of diversity of data available to you at the university?	0.78	4.44
17. Do you find that the available data matches the needs of scientific research in your field?	0.69	3.73
18. Do you find that the available data contributes to developing your academic and research skills at the university?	0.82	3.78
19. Are you satisfied with the quality of data available to you at the university?	0.78	3.60
20. Do you have difficulty exchanging data with colleagues or other departments at the university?	0.89	4.05

To answer the first question in the first axis on data analysis, which states 4.14.1.1 -What is the quality and quantity of data available to you at the university to support your academic and administrative operations? The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data.

1-Weighted average: reflects the suitability of data to support academic and administrative activities. High average scores (above 4) indicate that individuals are satisfied with the quality and adequacy of data. For example, questions related to the adequacy of data to meet academic research needs (4.40) and the ability to access data (4.38) show that there is a significant positive feeling towards the quality and quantity of data.

2-Standard deviation: indicates the degree of dispersion of opinions. A low standard deviation (such as 0.63) indicates broad consensus, while a high deviation (such as 0.89) indicates that there is a significant variation in individuals' experiences regarding the difficulty of sharing data with colleagues.

▪ **Advantages:**

- Data availability: Most members feel that data is available to them to support their activities, which enhances efficiency.
- Satisfaction with quality: High averages indicate that the data is considered reliable and of good quality, which enhances the effectiveness of academic and administrative decisions.

- **Accessibility:** The majority of individuals find that accessing data is not difficult, which makes it easier for them to carry out their tasks.

- **Disadvantages:**

- **Lack of diversity:** Some results indicate a feeling of lack of diversity in the available data, which may affect the comprehensiveness of research and decisions.
- **Difficulties in analysis:** Some individuals face difficulties in understanding the available data, which may reduce their ability to use it effectively.
- **Inadequacy of some data:** Although many individuals feel that the data is available, there are comments about the need for more data to support different activities.

- **Challenges:**

- **Challenges of exchange:** Difficulty in exchanging data between departments may negatively affect collaboration and innovation.
- **Data updating:** The need to provide updated and reliable data may be a major challenge, as the lack of recent data can affect decision-making.
- **Data analysis:** The need to improve individuals' analytical capabilities to better understand and use data.

4.14.1.2- How effective is the use of data and analytics in making academic or administrative decisions?

- Do you use data and analyzes in making academic or administrative decisions?	Standard Deviation	Weighted Mean
1. Do you use data and analytics to make academic decisions in your field of study?	0.78	4.02
2. Do you use data and analyzes to make administrative decisions in your administrative or supervisory activity?	0.76	4.05
3. How do you evaluate the effectiveness of using data and analytics in academic decision-making processes?	0.81	4.10
4. How do you evaluate the effectiveness of using data and analytics in administrative decision-making processes?	0.77	3.97
5. What type of data do you rely on primarily to make your academic decisions?	0.82	3.68
6. What type of data do you rely on mainly to make your management decisions?	0.75	4.00

7. Do you use specific data analysis tools in making academic decisions?	0.70	3.75
8. Do you use specific data analysis tools in making management decisions?	0.73	3.75
9. Do you find that using data and analytics contributes to improving the quality of academic decisions?	0.76	3.52
10. Do you find that the use of data and analytics contributes to improving the quality of administrative decisions?	0.72	3.88
11. Do you receive training or courses on how to use data and analytics to make decisions?	0.73	3.83
12. Do you find that using data and analytics helps predict future changes in your field of study?	0.75	3.95
13. Do you find that using data and analytics helps predict future changes in your administrative or supervisory activity?	0.78	3.73
14. Do you feel comfortable using data and analytics to make decisions?	0.71	3.73
15. Do you consider the use of data and analytics necessary to make effective decisions?	0.70	3.88
16. Do you have difficulty understanding or analyzing data to make decisions?	0.79	4.10
17. Do you find that using data and analytics increases the effectiveness of academic decision-making?	0.74	3.70
18. Do you find that the use of data and analytics increases the level of effectiveness of administrative decision-making?	0.69	4.35
19. Do you find that using data and analytics improves your academic performance?	0.72	4.05
20. Do you find that using data and analytics leads to improving the performance of your administrative or supervisory activity?	0.76	4.45

To answer the second question in the first axis on data analysis, which states 4.14.1.2- How effective is the use of data and analytics in making academic or administrative decisions?The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data.

1-The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data. Weighted average: The average points indicate

that there is a significant use of data and analytics in making decisions, as the average ranges between 3.52 and 4.45, indicating a degree of satisfaction with the effectiveness of these tools in improving the quality of decisions. For example, the question about the use of data in making academic decisions received an average of 4.02, indicating that individuals rely on data in their academic decisions.

2-Standard deviation: It shows the variation in opinions about the use of data. For example, a high standard deviation (0.82) in a question related to the type of data used in making academic decisions indicates a large variation in individuals' choices.

▪ **Advantages:**

- Use of data in decisions: The results indicate that most individuals rely on data and analytics when making academic and administrative decisions, which enhances the objectivity of these decisions.
- Improving quality: A large percentage of individuals believe that using data helps improve the quality of academic (3.52) and administrative (3.88) decisions.
- Increasing effectiveness: Some results indicate that using data increases the effectiveness of decision-making, which may positively reflect on academic and administrative performance.

▪ **Disadvantages:**

- Loss of effectiveness in some areas: Low averages in some questions, such as using analysis tools (3.75) and understanding data (4.10), indicate that there is room for improvement in using appropriate tools to understand and analyze data.
- Insufficient training: Some individuals reported not receiving sufficient training on how to use data and analysis, which may affect their ability to make informed decisions.

▪ **Challenges:**

- Understanding data: Although individuals find it difficult to understand and analyze data (0.79), they still use it in decision-making, indicating the need to provide appropriate training.
- Comfort with data: Many individuals feel uncomfortable using data, which may negatively affect decision-making strategies.
- Future predictions: Using data and analytics to anticipate future changes requires greater understanding and resources, which has not been fully achieved according to the results.

4.14.2 Cloud computing:

4.14.2.1- Do you use cloud computing services to store data or provide computer services at the university?

- Do you use cloud computing services to store data or provide computer services at the university?	Standard Deviation	Weighted Mean
1. Do you use cloud computing services to store your data at the university?	0.82	4.06
2. Do you prefer using cloud computing services over traditional data storage solutions?	0.73	4.00
3. What cloud services do you mainly use at the university? (Example: Google Drive, Microsoft OneDrive, Dropbox)	0.73	4.00
4. Do you think that using cloud computing services provides better security features for your data?	0.76	3.84
5. Do you think that using cloud computing services provides you with greater levels of mobility and access to your data?	0.81	4.10
6. Do you find that cloud computing services facilitate file sharing and collaboration with colleagues at the university?	0.77	3.38
7. Do you think that cloud computing services contribute to improving work efficiency and productivity at the university?	0.82	4.06
8. Do you use cloud computing services to provide computer services at the university? (eg Google Workspace, Microsoft Office 365)	0.80	3.66
9. What type of computing services do you use through cloud computing services?	0.75	3.82
10. Do you find that using cloud computing services reduces costs related to the university's computing infrastructure?	0.70	3.92
11. Do you find that cloud computing services help improve your experience studying or working at the university?	0.84	3.35
12. Do you find that cloud computing services enhance the sustainability and diversity of the university's computing infrastructure?	0.85	4.10
13. Do you face any challenges in using cloud computing services at the university?	0.77	3.85

14. Do you find that cloud computing services sufficiently meet your needs?	0.70	3.75
15. Do you use cloud computing services to backup your data?	0.74	3.70
16. Do you prefer using cloud computing services in educational institutions over traditional computer services?	0.81	3.75
17. Do you find that cloud computing services provide you with the ability to access your data from anywhere and at any time?	0.73	3.79
18. Do you think that using cloud computing services increases the security of your data?	0.75	3.85
19. Do you prefer to use public or private cloud computing services?	0.89	3.63
20. Do you think that cloud computing services contribute to improving the experience of using technology at the university?	0.70	3.90

To answer the second question in the second axis on cloud computing, which states 4.14.2.2- Do you use cloud computing services to store data or provide computer services at the university? The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data.

1-Weighted average: High averages (above 4) indicate good use of cloud computing services, as the average use of storage services was 4.06. This indicates that individuals tend to use these services increasingly, as 4.00 prefers using cloud computing over traditional solutions.

2-Standard deviation: High deviations in some questions (such as 0.89 in preferring to use public or private services) show a difference in opinions about choosing the type of cloud computing services.

▪ **Advantages:**

- Ease of access: Many individuals see that cloud computing provides higher levels of flexibility and access to data (4.10), which helps them perform their tasks better.
- Improving efficiency: The use of cloud computing services is considered an important factor in improving work efficiency and productivity (4.06), which contributes to accelerating academic and administrative processes.
- Data security: Some individuals believe that using these services provides better security features (3.84) to protect their data.

▪ **Disadvantages:**

- Difficulties in use: Some results indicate that cloud computing services may not adequately meet all users' needs (3.75) and may face challenges in using them (3.85).

- Limited collaboration: The low average (3.38) in the issue of facilitating file sharing and collaboration with colleagues shows that there is room for improvement in these aspects.

- User experience: Certain averages (such as 3.35) indicate that the experience of using cloud computing services may need improvement.

- **Challenges:**

- Diversity in computing services: Differences in opinions about the preference for using public or private computing services (0.89) may reflect uncertainty about what is best for use in educational environments.

- Challenges in accessing data: Although most individuals feel that they can access their data from anywhere, some may face difficulties in this aspect, which affects productivity.

- Efficiency of infrastructure: The university needs to improve the cloud computing infrastructure to ensure its sustainability and diversity in line with the needs of users.

4.14.2.2- What are your experiences in using cloud computing? Have you faced any challenges in this regard?

- What are your experiences in using cloud computing? Have you faced any challenges in this regard?	Standard Deviation	Weighted Mean
1. Have you tried using cloud computing services such as online storage, email, or office applications?	0.78	3.78
2. What type of cloud services have you used in the past or are you currently using?	0.82	3.72
3. What is your general experience using cloud computing?	0.75	3.90
4. Did you face any challenges in adopting cloud computing?	0.91	3.72
5. Have you had difficulty understanding how to use cloud computing services?	0.75	3.82
6. Did you experience reliability issues with the cloud services you used?	0.78	3.78
7. Have you encountered challenges in securing your data or privacy when using cloud computing?	0.73	3.82
8. Was there difficulty transferring your data to or from cloud computing services?	0.75	3.82
9. Have you faced challenges in retrieving your data or accessing it when needed?	0.78	3.78

10. Have you faced challenges managing your data on cloud computing services?	0.69	3.92
11. Did it take a long time to learn to use cloud computing services?	0.84	4.00
12. Have you found that using cloud computing services makes it easier for you to access your data from anywhere?	0.74	3.73
13. Have you used cloud computing services for teamwork or collaboration with colleagues?	0.73	3.77
14. Have you found that using cloud computing services increases the effectiveness of your work or study?	0.74	3.77
15. Do you feel comfortable using cloud computing services instead of traditional solutions?	0.74	3.85
16. Do you think that using cloud computing services saves you time and effort?	0.79	3.65
17. Have you used cloud computing services to backup your data?	0.73	3.81
18. Have you used cloud computing services to develop applications or websites?	0.69	4.05
19. Have you used cloud computing services to run specific applications or programs?	0.69	4.05
20. Are you currently facing any challenges in using cloud computing services	0.70	3.20

To answer the second question in the second axis on cloud computing, which states 4.14.2.2- What are your experiences in using cloud computing? Have you faced any challenges in this regard? The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data.

1-Standard deviation: The high deviation in some questions (such as 0.91 in facing challenges when adopting cloud computing) shows a difference in opinions about the difficulty of use and trust in services.

▪ **Advantages:**

- **Accessibility:** Many individuals indicate that cloud computing facilitates access to data from anywhere (3.73), which makes it easier for them to accomplish their tasks.
- **Application development:** Some individuals used cloud computing services to develop applications or websites (4.05), indicating great potential in this area.

• Improving effectiveness: The results indicate that using cloud computing services can enhance the effectiveness of work and study (3.77).

▪ **Disadvantages:**

- Challenges in understanding: There are some difficulties in understanding how to use cloud computing services (3.82), indicating the need for better training.
- Facing technical problems: Some users experience reliability problems in services (3.78) and difficulties in retrieving data when needed (3.78), which negatively affects their experience.
- Security challenges: Some individuals reported that they faced challenges in securing their data and privacy while using cloud computing services (3.82).

▪ **Challenges:**

- Learning services: Some individuals showed that they faced a long time to learn how to use cloud computing services (4.00), reflecting the need for improved education and training.
- Collaboration: Low averages (3.77) show that individuals did not find cloud computing an effective means of collaborating with colleagues, which requires improvements in this area.
- Ongoing challenges: Results indicate that many users still face challenges in using cloud computing services (3.20), which calls for additional attention to resolve these issues.

4.14.3 - Financial technology:

4.14.3 .1- How effective are digital financial systems at Kafr El-Sheikh University? Do they contribute to simplifying financial operations?

- Do the digital financial systems at Kafrelsheikh University contribute to simplifying financial operations?	Standard Deviation	Weighted Mean
1. Do you use digital financial systems at Kafrelsheikh University to manage your financial operations?	0.82	4.00
2. How do you evaluate the effectiveness of digital financial systems in facilitating payment and collection procedures at the university?	0.75	3.90
3. Have you noticed simplification of registration and tuition payment processes using digital financial systems?	0.83	4.10
4. Do you find that digital financial systems contribute to providing accurate and timely financial reports?	0.92	3.70
5. Have you used online banking or college financial apps?	0.81	4.00
6. Do you find that digital financial systems facilitate budgeting and financial planning processes at the university?	0.78	3.77

7. Have you found that using digital financial systems reduces the time required to complete financial transactions?	0.88	4.25
8. Did you face any challenges in adapting to digital financial systems at Kafrelsheikh University?	0.82	3.66
9. Do you find that digital financial systems enhance transparency and integrity in money management at the university?	0.79	3.75
10. Have you encountered any data security or privacy issues when using digital financial systems?	0.82	3.80
11. Have you used digital financial systems to manage purchases or expenses at the university?	0.77	3.55
12. Do you find that digital financial systems help improve financial monitoring and evaluation processes at the university?	0.69	4.05
13. Have you found that digital financial systems reduce administrative and paperwork procedures related to financial operations?	0.70	4.05
14. Have you noticed an improvement in organizing and managing financial records using digital financial systems?	0.93	3.68
15. Have you used digital financial systems to improve revenue collection and financial reporting?	0.77	3.85
16. Do you find that digital financial systems increase the accuracy of financial statements and reduce errors?	0.73	4.15
17. Did you have difficulty learning how to use digital financial systems?	0.82	4.00
18. Did you benefit from training or workshops to learn how to use digital financial systems at the university?	0.79	4.00
19. Do you think that digital financial systems contribute to achieving the university's financial goals in a better way?	0.73	3.70
20. Are there any recommendations that you would like to make to improve the effectiveness of digital financial systems at Kafrelsheikh University?	0.82	3.75

To answer the first question in the third axis on cloud computing, which states 4.14.3.1- How effective are digital financial systems at Kafr El-Sheikh University? Do they contribute to simplifying financial operations? The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data..

1. **Weighted average:** The results indicate that digital financial systems are effectively used by individuals, as the average use reached 4.00, indicating good acceptance of these systems in managing financial operations. The average facilitation of payment and collection procedures also reached 3.90, indicating the effectiveness of the system in this area.
2. **Standard deviation:** The high deviation in some questions (such as 0.92 in the accuracy of financial reports) shows that there is a difference in opinions about the effectiveness of the systems in providing accurate and timely reports.
 - **Advantages:**
 - Simplifying operations: The results showed that digital financial systems have contributed to simplifying the registration and tuition payment processes (4.10), which shows a positive impact on the user experience.
 - Saving time: A mean of 4.25 indicates that using digital financial systems reduces the time required to complete financial transactions, which increases efficiency.
 - Improving data accuracy: There is a general feeling that these systems enhance the accuracy of financial data and reduce errors (4.15), which makes it easier to manage financial affairs.
 - **Disadvantages:**
 - Adaptation challenges: Some reported that they faced difficulties in adapting to digital financial systems (3.66), indicating the need for additional support for users.
 - Level of transparency: Although there is a belief that the systems enhance transparency (3.75), the averages indicate that there is room for improvement in this aspect.
 - Security and privacy: Some individuals indicated that they faced issues related to data security and privacy (3.80), which calls for improvements in security aspects.
 - **Challenges:**
 - Training challenges: Although training averages indicate that educational support has been provided to users (4.00), difficulties in learning how to use the systems still exist.
 - Organization of records: Low averages (3.68) indicate that improving the organization and management of financial records still requires more efforts.
 - Planning challenges: Although the systems are considered useful in improving financial planning processes (3.77), there is a feeling that some aspects need improvement.

4.14.3 .2- Are electronic payment applications used regularly at the university?

- Do you use electronic payment applications at the university regularly?	Standard Deviation	Weighted Mean
1. Do you use electronic payment applications at the university regularly?	0.84	3.60
2. How do you evaluate your experience in using electronic payment applications at the university?	0.82	3.80
3. Do you find that electronic payment applications facilitate the process of paying for tuition fees or university services?	0.89	3.60
4. Do you prefer using electronic payment applications over paying in cash or using credit cards?	0.75	3.60
5. Have you noticed facilitation of the payment and collection process using electronic payment applications?	0.73	3.80
6. Did you benefit from the security features available in electronic payment applications?	0.78	3.75
7. Have you used electronic payment applications to purchase educational materials or textbooks?	0.73	3.80
8. Did you find diversity in the options available to you for using electronic payment applications at the university?	0.70	3.70
9. Did you face any challenges in using electronic payment applications at the university?	0.73	3.80
10. Do you find that electronic payment applications provide you with more comfort and ease in managing university financial matters?	0.84	3.65
11. Did you use electronic payment applications to pay accommodation fees or residential services at the university?	0.79	3.75
12. Do you find that using electronic payment applications helps track and manage your expenses better?	0.61	3.83
13. Have you found that electronic payment applications save you the time and effort required to complete payment processes?	0.87	3.65
14. Have you used electronic payment applications for university donations or contributions?	0.77	3.75
15. Do you prefer using electronic payment applications at the university over other available options?	0.73	3.85

16. Have you used electronic payment applications to purchase tickets for university events or activities?	0.73	3.75
17. Have you found that electronic payment applications provide you ease in managing your personal budget?	0.79	3.75
18. Have you noticed an improvement in the speed of executing payments using electronic payment applications?	0.73	3.75
19. Do you feel comfortable and safe when using electronic payment applications at the university?	0.73	3.80
20. Do you intend to use electronic payment applications in the future to manage financial operations at the university?	0.70	3.75

To answer the first question in the third axis on cloud computing, which states: 4.14.3.2- Are electronic payment applications used regularly at the university? The results were analyzed through weighted averages and standard deviations, which help to understand the effectiveness of the available data.

1-Weighted average: The results indicate that the regular use of electronic payment applications at the university is relatively low, as the average reached 3.60, indicating insufficient reliance on these applications in payment operations. The general experiences of these applications show an average of 3.80, indicating that users have positive but not strong enough experiences.

2-Standard deviation: The high deviation in some questions (such as 0.89 in facilitating payment for university services) shows that there is a difference in opinions about the effectiveness of these applications in facilitating payment, indicating a difference in experiences among users.

▪ **Advantages:**

- Ease of use: The results indicate that the applications provide comfort and ease in managing financial matters (3.65), indicating a significant advantage in interacting with these applications.
- Saving time and effort: The majority reported that using these applications helps save time and effort required to complete payment processes (3.65), which contributes to improving efficiency.
- Improving security: There is a general belief that the applications provide good security features (3.75), which enhances confidence in their use.

▪ **Disadvantages:**

- Low regular use: The result indicates that regular use of these applications is low (3.60), which means that there is a need to enhance reliance on them in daily operations.
- Usage challenges: Some users indicated that they faced difficulties in using these applications (3.80), which calls for improved technical support and guidance.

- Variety of options: Although the average variety of options was 3.70, it indicates a need to improve the available payment options.

- **Challenges:**

- Problems in user experience: Although the overall experience was positive, some users indicated that there were difficulties in dealing with the applications (3.80), which calls for improving the user interface and user experience.

- Challenges in tracking expenses: Although the average of 3.83 indicates that the applications help in tracking expenses, it also reflects that there are necessary improvements in this aspect.

- Comfort and security: Although there is a sense of comfort when using the applications (3.80), some users may feel insecure, which requires enhancing security measures.

5-Study results:

Study conclusions on the effectiveness of using digital transformation elements in information systems at Kafr El-Sheikh University:

1- Effectiveness of digital transformation:

- o The results showed statistical differences between data analysis, cloud computing, and financial technology in terms of effectiveness in improving performance.

- o Data analysis came as the most effective element, indicating its importance in supporting academic and administrative decision-making.

- o Cloud computing and financial technology have a similar role, without significant statistical differences between them.

2-Use of data in decision-making:

- o The quality of data is satisfactory and contributes to making informed decisions, but there is a need for greater diversity in data and facilitating its exchange between departments.

- o There are challenges in understanding and effectively using data, which requires additional training to improve users' analysis capabilities.

3-Cloud computing:

- o The university achieves good use of cloud computing, but users face challenges related to understanding services and collaborating across them, in addition to technical problems.

- o Recommendation: Enhance training and improve cloud infrastructure to provide greater flexibility in accessing data and increasing efficiency.

4-Digital Financial Systems:

- o Digital financial systems have improved the efficiency of financial operations, saved time and increased data accuracy, but they need improvements in security and transparency.

o Electronic payment applications need to be used more regularly, as the level of reliance on them is still low.

General Conclusion:

- The university should focus on developing the infrastructure for data analysis, and provide continuous training to improve users' skills.
- Enhancing security and transparency in digital systems is essential to increasing effectiveness.
- Improving the user experience in cloud computing and electronic payment applications requires greater technical support and raising awareness.

6- Study recommendations

Based on the study findings, the following recommendations can be made to enhance the effectiveness of using digital transformation elements in information systems at Kafrelsheikh University:

1-Data Analysis:

- o The need to focus on developing the infrastructure for data analysis at the university, by investing in advanced data analysis tools and techniques.
- o Providing intensive training programs for faculty members and staff to improve their ability to use data effectively in making academic and administrative decisions.

2- Diversification and exchange of data:

- o Working on diversifying the sources of data available at the university to ensure the comprehensiveness of the information used in analysis and decision-making.
- o Developing a system to facilitate the exchange of data between the various departments at the university, in a way that enhances cooperation between academic and administrative departments.

3-Cloud Computing:

- o Improving the cloud computing infrastructure within the university to ensure the provision of more stable and diverse services that suit the needs of users.
- o Providing periodic training for users to increase their understanding of the use of cloud computing services and improve cooperation through these tools.
- o Emphasizing the use of appropriate cloud computing solutions (whether public or private) to meet the needs of the educational environment.

4-Digital Financial Systems:

- o Enhancing the level of security and transparency in digital financial systems to ensure data protection and reduce risks.

- o Providing continuous technical support to users who face difficulties in using digital financial systems to ensure they adapt to them better.

- o Raising awareness among employees and students about the importance of electronic payment applications and facilitating their use in daily financial transactions.

5-Electronic payment applications:

- o Developing and improving electronic payment applications to enhance their regular use at the university, which contributes to facilitating financial transactions.

- o Improving security features in electronic payment applications to increase confidence in them and encourage users to rely on them more.

6-Improving the user experience:

- o The need to improve the user experience in all aspects of digital transformation (data analysis, cloud computing, and digital financial systems) by providing continuous technical support and providing appropriate training.

- o Enhancing cooperation between different departments through innovative digital solutions that facilitate communication and information exchange.

By following these recommendations, the university can take full advantage of digital transformation technologies and enhance the efficiency of administrative and academic systems.

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