

Enhancing Administrative Performance Efficiency through Digital Transformation Ministry of Education Context – Jordan

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Abstract

This study emphasized the execution of digital transformation inside the Jordanian Ministry of Education and its impact on enhancing administrative efficiency, while also outlining the obstacles to its prospective success. To achieve the purpose of the study, a descriptive-analytical technique was employed, and a simple random sample of 302 directors was selected from 1400 directors at the Ministry headquarters and its branch directorates. Data were gathered using a questionnaire comprising metrics for the installation of digital transformation tools, items evaluating administrative performance, and an open-ended question aimed at identifying potential impediments to the execution of digital transformation. The study's objectives were attained by analyzing the data with SPSS software, and the measurement and structural models were verified by structural equation modelling utilizing the partial least squares method with Smart PLS 4.1.1.4 software.

The research findings indicated that the Jordanian Ministry of Education is executing digital transformation at a modest level ($M = 3.49$), but its perceived impact on administrative performance efficiency was significant ($M = 3.85$). The findings further validated a beneficial effect of digital transformation on administrative performance efficiency, albeit with a moderate explained variance ($R^2 = 0.106$). Digital transformation is a crucial element affecting administrative performance, yet it is not the only predictor of administrative efficiency. The research, through objective analysis, identified three main types of obstacles to implementing digital transformation: human, technical and organizational. The human obstacles include resistance to change, holding on to using traditional paper-based procedures, inconsistent digital training, lack of qualified cadres and specialized leaderships in digital transformation. The objective analysis of the results also included technical challenges such as the, slow internet connectivity, the high cost of technology and maintaining it, insufficient infrastructure and some outdated devices, and bureaucratic procedures, while organizational obstacles were represented in bureaucratic procedures, limited funding, overlapping mandates and weak institutional support of innovative ideas. The research indicated that enhancing the efficacy of digital transformation requires transiting from the foundation stage to a more mature and integrated stage through developing the staff skills continuously, cultivating digital leadership, promoting organizational culture and institutional backing, reconstructing technical infrastructure, and enhancing

integration among digital systems, as well as reviewing regulatory and bureaucratic procedures – thereby contributing to improved administrative service quality, easier access to information and procedures, and greater administrative performance efficiency within the Jordanian Ministry of education.

Keywords: Digital Transformation, Administrative Performance Efficiency, Ministry of Education, Jordan.

تعزيز كفاءة الأداء الإداري من خلال التحول الرقمي: وزارة التربية والتعليم في الأردن نموذجا

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ملخص

هدفت هذه الدراسة إلى بحث واقع تطبيق التحول الرقمي في وزارة التربية والتعليم الأردنية، وبيان أثره في تعزيز كفاءة الأداء الإداري، إلى جانب تحديد أبرز التحديات التي تعيق تنفيذه. ولتحقيق أهداف الدراسة، اتبعت الدراسة المنهج الوصفي التحليلي، وتكون مجتمع الدراسة من (1400) موظفاً إدارياً في مقر وزارة التربية والتعليم ومديرياتها، حيث تم اختيار عينة عشوائية بسيطة بلغت (302) موظفاً إدارياً. وجمعت البيانات باستخدام استبانة تضمنت محاور لقياس آليات التحول الرقمي وأثره في كفاءة الأداء الإداري، إضافة إلى سؤال مفتوح لتحديد أبرز معوقات تطبيق التحول الرقمي من وجهة نظر أفراد العينة. وتم تحليل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS)، بالإضافة إلى نمذجة المعادلات الهيكلية باستخدام أسلوب المربعات الصغرى الجزئية (PLS-SEM) من خلال برنامج SmartPLS 4.1.1.4.

أظهرت النتائج أن مستوى تطبيق آليات التحول الرقمي في وزارة التربية والتعليم جاء بدرجة متوسطة، بمتوسط حسابي بلغ (3.49)، في حين جاء مستوى كفاءة الأداء الإداري المتحققة من التحول الرقمي بدرجة مرتفعة، بمتوسط حسابي بلغ (3.85). كما أظهرت نتائج النموذج الهيكلي وجود أثر إيجابي ذي دلالة إحصائية للتحول الرقمي في كفاءة الأداء الإداري، حيث بلغ معامل المسار $\beta = 0.326$ ، $(p < 0.001)$ ، في حين فسّر التحول الرقمي ما نسبته (10.6%) من التباين في كفاءة الأداء الإداري ($R^2 = 0.106$)، مما يشير إلى أن التحول الرقمي يمثل عاملاً مؤثراً في كفاءة الأداء الإداري، لكنه ليس العامل الوحيد المحدد لها.

كما كشفت نتائج التحليل الموضوعي للاستجابات المفتوحة عن ثلاثة أنواع رئيسية من التحديات التي تواجه تطبيق التحول الرقمي، تمثلت في التحديات البشرية، والتقنية، والتنظيمية. وجاءت التحديات البشرية في مقدمة المعوقات، ولا سيما مقاومة التغيير والتمسك بالإجراءات الورقية التقليدية، وعدم استمرارية

التدريب على المهارات الرقمية، ونقص الكوادر المؤهلة والقيادات المتخصصة في التحول الرقمي. كما شملت التحديات التقنية ضعف شبكات الاتصال وبطء الإنترنت وارتفاع تكاليف التكنولوجيا وصيانتها وضعف البنية التحتية وتقادم بعض الأجهزة، في حين تمثلت أبرز التحديات التنظيمية في الإجراءات البيروقراطية، ومحدودية التمويل، وتداخل الصلاحيات، وضعف الدعم المؤسسي للأفكار الابتكارية. وتخلص الدراسة إلى أن تعزيز كفاءة التحول الرقمي يتطلب الانتقال من مرحلة التأسيس إلى مرحلة أكثر نضجاً وتكاملاً، من خلال تطوير مهارات العاملين بصورة مستمرة، وتعزيز القيادة الرقمية والثقافة التنظيمية الداعمة للتغيير، وتطوير البنية التحتية التقنية، وتحسين التكامل بين الأنظمة الرقمية، ومراجعة الإجراءات التنظيمية والبيروقراطية، بما يساهم في رفع جودة الخدمات الإدارية وتسهيل الوصول إلى المعلومات والإجراءات وتحسين كفاءة الأداء الإداري في وزارة التربية والتعليم الأردنية.

الكلمات المفتاحية: التحول الرقمي، كفاءة الأداء الإداري، وزارة التربية والتعليم، الأردن

Introduction

In this digital era, 5G advancements, artificial intelligence, and cloud computing have transfigured organizations operation. Digital transformation has become essential for achieving institutional excellence and maintaining competitiveness, especially given that competitors are fully reliant on technology (Al-Wedyan et al., 2025), Alsayed & Allassaf, 2023). Digital transformation can be defined as the use of technology and internet to fully accomplish tasks within organizations, eliminating traditional and paper-based methods in order to accelerate work, reduce costs in the long run, and increase accuracy and efficiency. This transformation tries to simply digitizing existing processes; it supports innovative solutions and digital tools to improve user experience and reshape business models. In the case of public administration, that was a critical shift across smooth procedures, increasing transparency, breaking away from traditional models that tightening restrictions. (Harahsheh & Al-Oraimi, 2024), Wibawa, 2024).

In Jordanian government context, the government acknowledged the value of the digital transformation; therefore, they initiated radical reforms, mainly adding a Ministry for Entrepreneurship and Digital Economy. This was done to initiate the development of a complete digital government in order to replace traditional paper-based documentation processes with highly accurate electronic one. (Harahsheh

& Al-Oraimi, 2024) considering the Ministry of Education as a cornerstone of digital national development, it has become central to the government's digital transformation process and is striving to integrate digital tools into its operations to improve its administrative and educational functions (Alomari, 2024, Ayasrah et al., 2025). However, this process had its own challenges and difficulties that limited the ministry efficacy.

Performance can be defined as the sum of achievements and activities carried out to achieve the goals, since goals exist in all organizational levels. There are also activities in all those levels that are implemented to achieve those goals. Therefore, there is an operational, functional, and strategic performance. Performance has always been measured using several metrics and tools, most notably efficiency, which expresses achieving the greatest possible output from the available resources. Efficiency can also be defined as using the best methods to achieve a goal. This concept focuses on how processes and activities are implemented to achieve the goal in a way that minimizes waste and enables organizations to make optimal use of their available resources while maintaining acceptable levels of expected output quality.

According to the Jordanian Vision of 2025, the strategic direction was aiming to achieve complete digital transformation; however, its actual implementation within the Ministry of Education suffered from critical challenges that setback its real results on the administrative performance. (Alsayed & Alassaf, 2023). While revising the Global Knowledge Index you can assume that Jordan's ranking witnessed a significant decline recently, despite the Jordanian awareness regarding the technology benefits. This decline is partly attributed to a drop in indicators of technological, information, and communication development (Alsayed & Alassaf, 2023). Regarding the administrative performance, the Ministry continues to suffer from a digital and technological gap, connected with several implementing digitization and utilizing technology obstacles.

Through working at the Ministry of Education and based on the reports mentioned above, the researcher observed a difference between the ministry digital transformation plan and the reality of implementing digital transformation within it. Accordingly, this research problem lies mainly in the gap among the reality of administrative operations and how it must be depending on digital ministry vision, that challenges may lie into three areas: (Alshawabkeh, & Al Jasmi,(2025), Zhang,(2025).

- **Human Resources Challenges:** a clear shortage of leaders specializing in digital operations and significant lack of qualified staff for the desired transformation can be found in the ministry workforce. This would lead to considerable employees change resistance fearing from the unknown future jobs transactions and prefer to remain the familiar manual procedures.
- **Technological Challenges:** weak technological infrastructure and insufficient internet speed were noted in the ministry context, in addition to the expensive costs which may make the ministry spend for maintaining new systems and hinder digital administrative tasks.
- **Organizational Challenges:** regarding the organizational structure, the transformation promptness is lazy because of funding shortfall beside to the procedural bottleneck in decision-making, which may make it harder to achieve good progress toward digital maturity.

Regarding previous theoretical literature, many studies have addressed the topic of digital transformation in many contexts, including educational and administrative. In general, these studies tried to focus on the general reality for digital transformation process, while others tried to highlight the institutions readiness for digital transformation, and some of them addressed digital services; their quality and efficiency levels, and their impact on various governmental and private sectors institutional performance. However, recent studies in the Jordanian context, such as Alsayed & Alassaf, 2023, primarily addressed the digital transformation reality in Jordanian universities from the administrator's perspective, but they did not consider the impact that digital transformation might have on administrative performance in the Ministry of Education.

In previous administrative literature, Jordanian Ministry of Education received limited attention, as existing studies in Jordan focused primarily on universities, institutions, and other governmental sectors. This is despite the significant digital challenges and specific requirements of Jordanian Ministry of Education, stemming from its procedures uniqueness and the importance of its services for society advancement and progress. In addition, while previous studies often measured the readiness or provided services level, this study aims to go beyond that to understand the contributions of digital transformation to administrative performance, which gives it importance related to focusing on performance improvement.

Despite the widespread discussion aiming the digital transformation, there remains a significant need for deeper research. Studies focusing on demonstrating its contribution to improved overall performance, and particularly administrative performance within government sectors providing educational services such as the Ministry of Education, are scarce. This is especially crucial given the importance and unique nature of the services offered. While digital transformation has become an official reality, its impact remains weak, hampered by organizational, technical, and human resource challenges. (Harahsheh & Al-Oraimi, 2024; Alsayed & Alassaf, 2023)

Consequently, this study aimed to provide an empirical evidence using a quantitative approach to measure the impact that digital transformation may have on the efficiency of administrative performance, which may enable the researcher to find and present that evidence instead of merely describing the reality with regard to digital transformation and the administrative performance efficiency. Based on all, this research contributes to enriching administrative literature and bridging the gap resulting from the research scarcity by focusing on Jordanian Ministry of Education administrative in Jordan and linking digital transformation to its desired improvement.

We can conclude depending on the above that there is a must need to research that the reality which implement digital transformation mechanisms – digital infrastructure, human resource training, and a supportive organizational culture – may impact the administrative performance efficiency. Thus, this research tries to participate in closing that gap by exploring the current Ministry of Education digital transformation reality in order to identify the role it plays in enhancing managers, productivity, accuracy, and strategic decision-making processes.

Procedural Definitions:

1. Digital Transformation: Administrative use and support of digital processes by the Jordanian Ministry of Education that characterizes digital transformation in this research. It is measured by a digital transformation strategy, a strong technological infrastructure, continuous employee training in digital skills, leadership support, an organizational culture that embraces technological change, innovation, and the use of electronic systems to automate administrative tasks. The variable is based on five-point Likert scale responses to the digital transformation questionnaire.
2. Administrative Performance Efficiency: The digital transformation is measured by

how well it streamlines administrative processes, boosts employee productivity, improves administrative service quality and accuracy, aids data-driven decision-making, helps the Ministry meet its strategic goals, reduces time and paperwork, and improves information and resource sharing. This variable is determined by respondents' five-point Likert scale responses to administrative performance efficiency questionnaire items.

3. Implementation challenges: Procedure definition concerns in this study are the biggest obstacles to digital transformation in the Jordanian Ministry of Education's administrative operations. Human barriers (resistance to change, lack of digital skills, need for additional training, lack of qualified digital leaders), technical barriers (weak technological infrastructure, slow internet, old devices, high maintenance costs, cybersecurity issues), and organizational barriers (an open-ended question in the questionnaire requested respondents to list up to three barriers to digital transformation in the Ministry's administrative functions, answer theme analysis indicated human, technological, and organizational difficulties).

Theoretical Framework:

1. The Imperative of Digital Transformation in Public Administration

Owing to the information and communication technologies rapid development, modern public and private organizations nowadays consider digital transformation as an essential necessity. Worldwide, governments started increasingly to rely on digital solutions for public services to improve efficiency, guarantee citizen involvement, and fueling economic expansion. (Alvarenga et al., 2020), Feng & Ali, 2024). Digital transformation causes a great challenge to government traditional bureaucratic methods, enforces organizations to improve their performance and keeps a certain level of service quality to survive in a new world which is technology-driven. (Harahsheh & Al-Oraimi, 2024), Khatir & Madani, 2024). When it is about Jordan, the Jordanian government adopted digital transformation as a pivotal strategic project, they started to launch many initiatives in public sector in order to replace classic processes that uses routine paper work with simpler and faster electronic one. This digital transformation was to improve flexibility, speed, accuracy, and transparency, while reducing costs, which may finally lead to a wholly incorporated digital

government. The Jordanian Ministry of Education's success, as any government institution, depends not only on updating its technologies of doing work, but more importantly on implementing an organizational restructuring depending on the changes which the new digital technologies and innovative practices did to ensure the desired performance. (Harahsheh & Al-Oraimi, 2024), Al-Saudi, & Flayyih, 2024) (Abdilhafez, Refaai, & Abdul Aziz, 2024).

This study aims to investigate the impact of implementing digital transformation techniques—including infrastructure support, human resource readiness, and organizational culture adoption—on the resulting administrative performance efficiency within the Jordanian Ministry of Education.

2. The Conceptual Framework of Digital Transformation in Public Sector Administration

Digital transformation encompasses a series of value-added activities that restructure business processes and models through technological innovation, with the aim of supporting and enhancing user experience and increasing operational efficiency. (Harahsheh & Al-Oraimi, 2024), Abdilhafez, Refaai, & Abdul Aziz, 2024). Digital transformation is not merely the implementation of a technological solution; it is an organizational change that leverages digital technologies and the practices they generate. (Alsayed & Alassaf, 2023), (Alzayat, M. 2024).

For administrative functions within a ministry, DT (Digital Transformation) is structured around key mechanisms (or inputs) that determine the change effectiveness.

2.1. Core Digital Transformation Mechanisms (Inputs)

The success of DT relies heavily on establishing supporting structures across several dimensions.

1. **Digital Infrastructure:** Digital infrastructure is fundamental and the primary indicator of the availability of the necessary technological systems for digital transformation. This infrastructure includes reliable technological devices, high-speed internet, and the software and systems required for efficient digital administrative tasks. Investing in a robust and efficient digital infrastructure provides greater capacity for data processing and exchange, as well as improved operational efficiency.(Harahsheh & Al-Oraimi, 2024), (Frinaldi, Afdalisma, Rezeki, & Saputra, 2024)

2. **Human Resources and Training:** The entire digital transformation process revolves around the human element by emphasizing the presence of the competencies and skills necessary for digital transformation within the workforce for the transformation success. Therefore, continuous development and training programs must be provided to enhance the digital skills and employees capabilities, in addition to enabling them with the technology that supports the required administrative work, as enabling employees with technology and digital tools is pivotal and essential to enhance the organization's productivity and effectiveness.(Harahsheh & Al-Oraimi, 2024), (Mohsen,& Magdi, 2022).
3. **Organizational Culture:** This dimension focuses on the values, behaviors, and beliefs that support digital transformation and enable organizations to implement it effectively. A positive digital organizational culture that encourages collaboration, acceptance of change, and innovation fosters digital transformation. (Harahsheh & Al-Oraimi, 2024). It is also essential to provide effective change management techniques and clear transparent communication to overcome employee change resistance and their attachment to traditional methods. (Alomari, 2024), (Sharmin, & Chowdhury, 2025). Aneta, Akib, Pakaya, & Hulinggi, 2025).
4. **Strategy and Leadership:** Having a strategic vision and a clear roadmap ensures that the digital transformation strategy aligns with the organization's goals and overall objectives (Harahsheh & Al-Oraimi, 2024). Numerous experiences and studies have emphasized the organizational leadership importance to guide employees during the digital transformation process and the implementation of new technologies by fostering innovation and providing the necessary support for undertaking complex change initiatives. (Rubio-Andrés, Linuesa-Langreo,Gutiérrez-Broncano, & Sastre-Castillo, 2025, Al-Wedyan et al., 2025, Alsayed & Alassaf, 2023).

Applying digital transformation to management automates routine procedures and tasks such as record keeping, data entry, and document management. Automation significantly reduces paperwork and improves workflow quality, allowing managers to focus their time and effort on more valuable and strategic tasks.(Al omary, 2024,

Aneta, Akib, ET, al. 2025).

3. The Impact of Digital Transformation on Administrative Performance Efficiency (Outcomes)

Administrative performance efficiency can be understood through several related forms of efficiency. Productive efficiency refers to achieving the highest possible output by using available administrative resources. Technical efficiency concerns the ability of an institution to complete tasks and services with minimum waste of time, effort, and resources. Allocative efficiency refers to directing resources toward the most important administrative priorities. Vertical efficiency relates to the effectiveness of coordination between different hierarchical levels of management, while horizontal efficiency concerns coordination across departments and directorates. Social efficiency reflects the extent to which administrative performance contributes to better public service outcomes and stakeholder satisfaction. In the context of this study, administrative performance efficiency mainly refers to productive, technical, and procedural efficiency, as digital transformation is examined in relation to simplifying procedures, increasing productivity, improving service quality, supporting decision-making, reducing paperwork, and facilitating information sharing within the Jordanian Ministry of Education.

Digital design plays a key role in enhancing institutional excellence in the public sector through its direct impact on measurable organizational outcomes; therefore, public sectors are adopting this modern management approach in carrying out their various tasks and objectives.(Harahsheh & Al-Oraimi, 2024). Such as:

1. **Increased Productivity and Operational Efficiency:** By automating procedures and simplifying tasks and processes, digital transformation enables organizations to optimize resource utilization. Digital transformation contributes to increased efficiency and reduced potential errors and associated repair costs because it simply converts manual processes into integrated digital ones. Furthermore, it enhances efficiency by accelerating and simplifying administrative procedures, allowing them to be completed with less time and effort. (Ikwuanusi, Onunka, Owoade, & Uzoka, 2024).
2. **Service Excellence and Quality:** Digital transformation through the use of electronic tools raises the quality of services provided by the Ministry to

beneficiaries (students, teachers, and employees). Digital tools also make the process of providing services to them easier, faster, more adaptable, and more suitable to their needs (Harahsheh & Al-Oraimi, 2024, Tawfik 2024), which ensures the provision of administrative services of a high level of quality and accuracy. (Dhameria, et. al, 2025).

3. **Knowledge and Decision-Making Excellence:** By enabling organizations to collect, analyze, organize, and gain valuable insights from their data, digital technology significantly facilitates knowledge as a source of excellence. It also empowers managers to make informed strategic decisions and identify areas needing support or development through process monitoring tools and data analytic techniques. Furthermore, it simplifies resource and information sharing among employees and creates accessible channels for accessing information. (Harahsheh & Al-Oraimi, 2024, Nijhum, 2025).
4. **Strategic Alignment and Adaptability:** Organizations are making every effort to adapt to the ever-changing environments they deal with in the hope of maintaining their market position among competitors. Digital technology enables organizations to reach their strategic goals by providing the necessary technological advantage to quickly respond to market dynamics and work. (Harahsheh & Al-Oraimi, 2024, Gao, et, el. 2023).

4. Challenges to Digital Transformation Implementation

Despite the fact that digital transformation has a lot of advantages to consider as a strategic necessity, Jordanian public organizations frequently face significant challenges that may cause harmful delay on successful implementation:

1. **Insufficient Funding and Cost:** Digital transformation initiatives are particularly costly for resource-limited organizations, and a lack of funding can prevent adequate investment in infrastructure and the provision of appropriate employee training programs..(Al-Wedyan et al., 2025, Liu, & He 2024).
2. **Technological and Infrastructure Deficiencies:** Many organizations suffer from weak IT infrastructure and poor access to high-speed internet needed to support large-scale digital activities, which hinders full digital maturity.(Alomari, 2024), (Dobrolyubova, 2021).
3. **Resistance and Culture:** Resistance to change among staff and management

remains. Organizations also constantly face the challenge of change resistance among employees and management whether due to a lack of awareness or a preference for maintaining current processes. Overcoming this state requires a dedicated change management team with a clear objective (Alomari, 2024). This is further compounded by the challenge of a lack of leadership that supports digital transformation (Al-Wedyan et al., 2025), (Aneta, et. al. 2025).

4. **Digital Skills Gap:** The challenges of skilled workers in digital skills applications shortage, coupled with difficulties in developing appropriate digital skills among employees, contribute to limiting the adoption of digital transformation initiatives. (Alomari, 2024) (Al-Wedyan et al., 2025), (Nijhum, 2025).

Integrated planning, financial investment, and the development of a supportive culture to address these challenges have become urgent for the Jordanian Ministry of Education in order to achieve the highest level of returns from implementing its digital strategies and greatly support the administrative performance efficiency.

Materials and Methods

Research Design

This study adopted an analytical-descriptive research design, one of the most wide used approaches in the administrative and social sciences owing to its flexibility and comprehensiveness. The descriptive component was employed to characterize the variables of the study and the perceptions of the respondents, whereas the analytical component was used to examine, quantify, and interpret the relationships between the variables through appropriate statistical procedures. This design was considered suitable for evaluating the current state of digital transformation in the Jordanian Ministry of Education and for testing its hypothesized effect on the efficiency of administrative performance.

Study Population and Sample

The study population comprised all administrators working at the headquarters of the Ministry of Education and its affiliated departments, numbering 1,400 administrators. Given the large size of the population, the sampling tables of Sekaran and Bougie (2016) were used to determine the required sample size, which indicated

a minimum of 302 respondents. A simple random sample of 302 administrators was therefore drawn. The questionnaire was distributed electronically to the selected sample, and all returned responses were complete and valid for statistical analysis.

The adequacy of the sample size was confirmed from three complementary perspectives. First, according to the sampling tables of Sekaran and Bougie (2016), a population of 1,400 requires a minimum sample of 302, which was fully achieved. Second, the obtained sample satisfies the “ten-times rule” for partial least squares structural equation modelling (PLS-SEM), as 302 observations greatly exceed ten times the maximum number of structural paths directed at any construct (Hair et al., 2022). Third, an a-priori power analysis conducted with G*Power 3.1 (linear multiple regression, one predictor, medium effect size, $\alpha = 0.05$, power = 0.80) indicated a minimum required sample of 55; the realized sample of 302 therefore yields an achieved statistical power well above 0.99, confirming that the sample is more than adequate for detecting the hypothesized effect.

Table (1) Study population and sample

Item	Value
Target population	1,400 administrative employees, Ministry of Education – Jordan
Sampling technique	Simple random sampling
Required sample size	302
Basis for sample size	Sekaran & Bougie (2016) sample-size determination table for $N \approx 1,400$
Valid responses analyzed	302

Table (2) Demographic Distribution of the Study Sample

Variable	Category	Frequency
Job Level	Senior Management	33
	Middle Management	56
	Administrative Staff	213
	Total	302
	Total	302

Variable	Category	Frequency
Department / Directorate	Secretariat of the Education Council and Planning Committee	7
	International Buildings and Projects Management	14
	Department of Educational Supervision and Training	24
	Examinations and Tests Department	9
	Department of Educational Planning and Research	10
	Education Management	35
	Legal Affairs Department	42
	Financial Affairs Department	30
	Department of Cultural and Public Relations	28
	Supplies and Procurement Management	23
	Curriculum and Textbook Management	10
	School Management	5
	Human Resources Management	31
	Educational Activities Department	18
	The Queen Rania Al Abdullah Centre for Educational Technology and Information Management	16
	Total	302

Study Instrument

Aiming to achieve the study objectives required data collected, a structured questionnaire was developed based on the study model and informed by related previous studies and scholarly research, dimensions, and variables of the study. The instrument consisted of four sections. The first section, demographic information, captured the personal characteristics of the respondents, namely job level, years of experience in the Ministry, and department or directorate. The second section, digital transformation mechanisms (Inputs), measured the extent of the implementation and support of digital transformation in administrative work through seven items. The third section, the impact of digital transformation on Administrative performance efficiency (Outputs), measured the perceived effect of digital transformation on administrative performance and efficiency through seven

items. The fourth section, **challenges to implementation**, an open-ended question was directed to the managers in the study sample to identify the challenges they face in implementing and utilizing technology, so that we could present and discuss them and achieve the research objective, which aims to identify and address these problems. To reach that end respondents were asked to list no more than three factors and briefly explain them. Thus, this question measures the most prominent challenges that prevent the successful implementation of digital transformation in the administrative processes of the Ministry of Education.

The questionnaire followed a cognitive measurement method based on the five-point Likert scale to determine the degree of agreement of the study sample members on the items of the study instrument based on the weight of the response. The researcher distributed the study instrument (questionnaire) electronically to the study sample, and was able to retrieve all responses, all of which were valid for the purposes of statistical analysis. As shown in the Table below, the statements are distributed across their sources from previous studies:

Digital Transformation Mechanisms (Inputs)

The Ministry adopts a clear and announced strategy for digital transformation in administrative procedures.	Al-Wedyan, Alzoubi, & Ababneh, (2025).
The necessary technological infrastructure (devices, sufficient internet flow, software) is reliably available for effective digital administrative tasks.	Alomari, (2024).
The Ministry provides continuous and effective training programs to develop employees' required digital skills.	Al-Wedyan, Alzoubi, & Ababneh, (2025). Harahsheh, & Al-Oraimi, (2024).
Digital transformation efforts are supported by effective institutional leadership and an organizational culture that accepts technological changes.	Harahsheh, & Al-Oraimi, (2024)
The Ministry encourages employees to take initiative and innovate training in utilizing digital technologies to improve administrative work.	Al-Wedyan, Alzoubi, & Ababneh, (2025).

Advanced electronic systems are widely used to automate routine administrative tasks (e.g., registration, record keeping)	Alomari, (2024).
The organizational culture supports collaboration and innovation necessary for successful digital transformation efforts	Harahsheh, & Al-Oraimi, (2024).

Impact on Administrative Performance Efficiency (Outcomes)

Digital transformation has successfully helped to expedite and simplify administrative procedures (e.g., record keeping, transactions).	Alomari, (2024). Al-Wedyan, Alzoubi, & Ababneh, (2025).
Digital transformation has contributed to increasing employee productivity and efficiency in administrative operations.	Alomari, (2024).
Digital transformation has improved the quality and accuracy of administrative services provided to beneficiaries (e.g., schools, students, staff).	Al-Wedyan, Alzoubi, & Ababneh, (2025). Harahsheh, & Al-Oraimi, (2024).
Digital transformation has enhanced employees' ability to access data needed to make strategic decisions.	Alomari, (2024). Al-Wedyan, Alzoubi, & Ababneh, (2025).
Digital transformation has helped the Ministry to achieve its strategic goals and adapt to rapid environmental changes.	Al-Wedyan, Alzoubi, & Ababneh, (2025).
Digital transformation helps to streamline and expedite internal administrative processes (reducing time and paperwork)	Alomari, (2024).
Digital transformation enables seamless sharing and greater accessibility of resources and information among staff	Alomari, (2024).

Challenges to Implementation:

What do you consider the primary challenges or obstacles hindering the successful implementation of Digital Transformation in the Ministry of Education's administrative operations? (Please list up to three factors and explain briefly.)

Reliability of the study tool

The internal consistency reliability of the questionnaire was examined using Cronbach's alpha coefficient, where a value of 0.70 or higher indicates acceptable reliability, and values approaching 1.00 reflect stronger reliability (Sekaran & Bougie, 2016). The results are reported in Table (3).

Table (3): Reliability coefficients of the study instrument

Variable	Cronbach's alpha
Digital transformation mechanisms (inputs)	0.965
Impact of digital transformation on administrative performance efficiency (outputs)	0.940
Overall instrument	0.926

As shown in Table (3), the Cronbach's alpha coefficients of the two sub-scales ranged between 0.940 and 0.965, and the coefficient for the overall instrument reached 0.926. All values comfortably exceed the 0.70 threshold, confirming the reliability of the questionnaire and the consistency of its items, and thereby supporting its suitability for subsequent statistical analysis.

Ethical Considerations

The study was conducted in accordance with established research ethics. Participation was entirely voluntary, and informed consent was obtained through an introductory statement that explained the purpose of the study and assured respondents that their participation was optional. The anonymity and confidentiality of the respondents were guaranteed; demographic information was collected on an optional basis and contained no personally identifying details. All data were used solely for academic research purposes, and the necessary administrative permissions to distribute the questionnaire to the target population were obtained prior to data collection.

Data Analysis Procedures

The collected data were analyzed using two complementary software packages. The Statistical Package for the Social Sciences (SPSS) was used to compute descriptive statistics, including frequencies and percentages to describe

the characteristics of the sample, and arithmetic means, standard deviations, ranks, and relative importance to describe the responses to the study variables. The one-sample t-test (test value = 3) was applied to determine whether the observed item means differed significantly from the neutral point of the scale. The standardized residuals of the structural relationship were further examined for heteroscedasticity and normality to provide additional assurance regarding the robustness of the estimates.

SmartPLS 4.1.1.4 was used to estimate the partial least squares structural equation model. The measurement model was assessed to verify the reliability and validity of the latent constructs by examining indicator loadings, internal consistency, and convergent and discriminant validity. The structural model was then evaluated to test the hypothesized relationship through collinearity diagnostics, model-fit indices, the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and path coefficients obtained from a bootstrapping procedure based on 5,000 subsamples. As a non-parametric, distribution-free technique, PLS-SEM does not require the normality assumptions of covariance-based methods (Hair et al., 2022). The possibility of common method bias was assessed using Harman's single-factor test and the full-collinearity approach of Kock (2015). Finally, the responses to the open-ended question were examined through inductive thematic analysis following the six-phase procedure of Braun and Clarke (2006).

Results

Demographic Profile of the Respondents

The demographic characteristics of the respondents — job level, years of experience in the Ministry, and department or directorate — were described using frequencies and percentages, as presented in Table (4).

Table (4): Demographic Profile of the Respondents

Variable	Category	Frequency	Percentage
Job level	Senior Management	33	11.0
	Middle Management	56	18.5
	Administrative Staff	213	70.5

Variable	Category	Frequency	Percentage
	Total	302	100
Years of experience	Less than 5 years	35	11.6
	5–10 years	69	22.8
	More than 10 years	198	65.6
	Total	302	100
Department / Directorate	Secretariat of the Education Council and Planning Committee	7	2.3
	International Buildings and Projects Management	14	4.6
	Department of Educational Supervision and Training	24	7.9
	Examinations and Tests Department	9	3.0
	Department of Educational Planning and Research	10	3.3
	Education Management	35	11.6
	Legal Affairs Department	42	13.9
	Financial Affairs Department	30	9.9
	Department of Cultural and Public Relations	28	9.3
	Supplies and Procurement Management	23	7.6
	Curriculum and Textbook Management	10	3.3
	School Management	5	1.7
	Human Resources Management	31	10.3

Variable	Category	Frequency	Percentage
	Educational Activities Department	18	6.0
	Royal Rania Al Abdullah Centre for Educational Technology and Information Management	16	5.3
	Total	302	100

Table (4) shows that administrative employees constituted the largest segment of the sample (70.5%), while respondents occupying senior and middle management positions together accounted for 29.5%. This distribution is consistent with the administrative hierarchy of public organizations in which staff numbers decline at higher managerial levels. The majority of respondents (65.6%) had more than ten years of experience in the Ministry, indicating that the sample possesses substantial practical experience relevant to the tasks under investigation. Respondents were distributed across the Ministry's departments and directorates in broadly comparable proportions, reflecting the diversity of functions and activities carried out by the Ministry and its affiliated units.

Descriptive Analysis of the Study Variables

To address the study questions, the arithmetic means, standard deviations, ranks, and relative importance of the responses ($n = 302$) were computed for every item of the two study variables. The one-sample t-test was applied against the scale midpoint (test value = 3) to determine whether each observed mean differed significantly from the neutral level. The level of each item was classified as low (1.00–2.33), medium (2.34–3.67), or high (3.68–5.00). The results for the digital transformation mechanisms are reported in Table (5).

Table (5): Descriptive Statistics and One-sample T-test Results for the Digital Transformation Mechanisms (inputs)

No .	Item	Mean	SD	t-value	Sig.	Rank	Rel. imp. %	Level
q1	The Ministry adopts a clear and announced strategy for digital transformation in administrative procedures.	3.61	0.94	11.277	0.000	1	72.2	Medium
q2	The necessary technological infrastructure (devices, sufficient internet flow, software) is reliably available for effective digital administrative tasks.	3.49	1.02	8.348	0.000	5	69.8	Medium
q3	The Ministry provides continuous and effective training programs to develop employees' required digital skills.	3.38	1.05	6.289	0.000	6	67.6	Medium
q4	Digital transformation efforts are supported by effective institutional leadership and an organizational culture that accepts technological change.	3.52	0.98	9.221	0.000	4	70.4	Medium
q5	The Ministry encourages employees to take initiative and innovate training in using digital technologies to improve administrative work.	3.58	0.96	10.499	0.000	2	71.6	Medium
q6	Advanced electronic systems are widely used to automate routine administrative tasks (e.g., registration, record keeping).	3.55	0.99	9.655	0.000	3	71.0	Medium
q7	The organizational culture supports the collaboration and innovation necessary for successful digital transformation efforts.	3.31	1.07	5.035	0.000	7	66.2	Medium
Digital Transformation (overall)		3.49	0.92	9.256	0.000	—	69.8	Medium

Table (5) indicates that the implementation and support of digital transformation were perceived at a medium level overall (mean = 3.49; relative importance = 69.8%), with item means ranging between 3.31 and 3.61. The adoption of a clear, announced strategy and the encouragement of initiative and innovation ranked highest, whereas the continuity of digital training and the supportiveness of the organizational culture ranked the lowest. All t-values were statistically significant ($p < 0.05$), with means significantly above the midpoint, indicating a genuine but not-yet-mature institutional adoption of digital transformation.

The results for the impact of digital transformation on administrative performance efficiency are reported in Table (6).

Table (6): Descriptive Statistics and One-sample T-test Results for Administrative Performance Efficiency (outputs)

No.	Item	Mean	SD	t-value	Sig.	Rank	Rel. imp. %	Level
q8	Digital transformation has helped to expedite and simplify administrative procedures (e.g., record keeping, transactions).	3.92	0.84	19.033	0.000	2	78.4	High
q9	Digital transformation has contributed to increasing employee productivity and efficiency in administrative operations.	3.96	0.82	20.345	0.000	1	79.2	High
q10	Digital transformation has improved the quality and accuracy of administrative services provided to beneficiaries (e.g., schools, students, staff).	3.88	0.86	17.782	0.000	3	77.6	High
q11	Digital transformation has enhanced employees' ability to access the data needed to make strategic decisions.	3.79	0.88	15.601	0.000	6	75.8	High
q12	Digital transformation has helped the Ministry to achieve its strategic goals	3.85	0.85	17.378	0.000	4	77.0	High

No.	Item	Mean	SD	t-value	Sig.	Rank	Rel. imp. %	Level
	and adapt to rapid environmental change.							
q13	Digital transformation helps to streamline and expedite internal administrative processes (reducing time and paperwork).	3.74	0.90	14.289	0.000	7	74.8	High
q14	Digital transformation enables seamless sharing and greater accessibility of resources and information among staff.	3.81	0.87	16.180	0.000	5	76.2	High
Administrative Performance Efficiency (overall)		3.85	0.81	18.236	0.000	—	77.0	High

Table (6) shows that the perceived impact of digital transformation on administrative performance efficiency was high overall (mean = 3.85; relative importance = 77.0%), with item means ranging between 3.74 and 3.96. Increasing employee productivity and expediting administrative procedures ranked highest, whereas enhancing access to data for strategic decision-making ranked relatively lowest. All t-values were statistically significant ($p < 0.05$) and well above the test value, confirming that the digital tools already in use generate tangible efficiency returns.

With respect to statistical power, given the sample size ($n = 302$), the observed structural effect size ($f^2 = 0.119$), one predictor, and $\alpha = 0.05$, the achieved post-hoc statistical power exceeds 0.99 using G*Power 3.1, indicating ample sensitivity to detect the hypothesized effect and a negligible risk of Type II error.

Challenges to Implementation: Thematic Analysis of the Open-ended Responses

The fourth section of the questionnaire invited respondents to specify, in their own words, up to three of the most important challenges or obstacles hindering the successful implementation of digital transformation in the Ministry's administrative operations. Of the 302 respondents, 96 (31.8%) provided usable answers, generating 191 discrete obstacle statements, with an

average of approximately two factors per respondent. These responses were examined through an inductive (data-driven) thematic analysis following the six-phase procedure of Braun and Clarke (2006), and the trustworthiness of the coding was supported through iterative cross-checking until a stable consensus framework was reached (Nowell et al., 2017). Sixteen first-order codes emerged from the data and were consolidated into three superordinate themes: human (capacity-related) barriers, technical (infrastructural) barriers, and organizational (governance) barriers. Frequencies are reported as counts (n) and as percentages of the 96 respondents who answered the open-ended question; because each respondent could list up to three factors that frequently spanned more than one theme, the percentages are not mutually exclusive and sum to more than 100%. The thematic structure, with representative quotations translated from the original Arabic, is summarized in Table (7).

Table (7): Thematic Analysis of the Open-ended Responses on Obstacles to Digital Transformation (n = 96)

Theme	Sub-theme (description)	n	%	Representative quotation(s)
Human / capacity-related barriers	Obstacles rooted in people, skills, leadership and readiness for change (respondent-level prevalence)	73	76.0	
	Resistance to change and attachment to manual, paper-based procedures	29	30.2	<i>"Employees resist change and prefer the paper-based procedures."</i>
	Insufficient and discontinuous digital training	26	27.1	<i>"Training on digital skills is weak and is not sustained over time."</i>
	Lack of qualified personnel to operate the electronic systems	21	21.9	<i>"There are too few qualified staff to operate the electronic systems."</i>
	Shortage of specialized digital-transformation leaders	14	14.6	<i>"We lack leaders who are specialised in digital transformation."</i>
Technical /	Obstacles rooted in networks,	44	45.8	

Theme	Sub-theme (description)	n	%	Representative quotation(s)
infrastructural barriers	devices, cost and security of the technical base (respondent-level prevalence)			
	Inadequate communication networks and slow internet	18	18.8	<i>"Weak networks and slow internet hold the work back."</i>
	High cost of the technology and its maintenance	14	14.6	<i>"The cost of the technology and its maintenance is high."</i>
	Weak infrastructure and outdated devices and computers	8	8.3	<i>"The infrastructure is weak and the devices are old."</i>
	Digital divide in rural and remote areas	7	7.3	<i>"There is a digital gap in the rural and remote areas."</i>
	Cybersecurity and data-protection concerns	5	5.2	<i>"There are fears about cybersecurity and protecting the data."</i>
Organizational / governance barriers	Obstacles rooted in funding, strategy, bureaucracy and institutional support (respondent-level prevalence)	43	44.8	
	Bureaucratic routine that slows the pace of transformation	12	12.5	<i>"Bureaucratic routine slows the pace of the transformation."</i>
	Insufficient funding in the education budget	8	8.3	<i>"The funding in the education budget is not sufficient."</i>
	Limited awareness of the importance of digital transformation	7	7.3	<i>"There is weak awareness of the importance of digital transformation."</i>
	Absence of a clear vision and strategy	7	7.3	<i>"There is no clear vision or strategy."</i>
	Weak support for creative and innovative ideas	6	6.2	<i>"Creative and innovative ideas receive little support."</i>

Theme	Sub-theme (description)	n	%	Representative quotation(s)
	Overlap of other ministries' powers delays decisions	5	5.2	<i>"Overlapping powers with other ministries delay the decisions."</i>
	Conflicts of interest and the reluctance of some officials	4	4.2	<i>"There are conflicting interests and some officials hesitate."</i>
Total	Total discrete obstacle statements coded (up to three per respondent)	191	—	

Note. n and % are computed on the 96 respondents who answered the open-ended question; percentages exceed 100% in aggregate because each respondent could report up to three factors spanning more than one theme. Quotations are representative renderings translated from the original Arabic, with obvious spelling errors corrected without altering meaning.

Human (capacity-related) barriers were by far the most prevalent theme, cited by 73 of the 96 respondents (76.0%) and accounting for 90 of the 191 coded statements. Within this theme, resistance to change and attachment to manual, paper-based procedures was the single most frequently reported obstacle overall (n = 29; 30.2%), followed by insufficient and discontinuous digital training (n = 26; 27.1%), a shortage of personnel qualified to operate the electronic systems (n = 21; 21.9%), and a shortage of specialized digital-transformation leaders (n = 14; 14.6%). Taken together, these codes locate the principal constraint on digital transformation not in the technology itself but in the human and behavioral readiness of the administrative workforce to absorb and sustain it. This finding directly illuminates the descriptive results, since the two lowest-ranked input items in Table (5) were precisely the continuity of digital training (q3; mean = 3.38) and the supportiveness of the organizational culture (q7; mean = 3.31). The convergence between the weakest closed items and the most frequently volunteered obstacles indicates that the medium maturity of digital transformation is, in the respondents' own account, a problem of capability and acceptance rather than of strategic intent.

Technical (infrastructural) barriers formed the second theme, reported by 44 respondents (45.8%) and accounting for 52 coded statements. The most prominent

sub-theme was inadequate communication networks and slow internet (n = 18; 18.8%), followed by the high cost of technology and its maintenance (n = 14; 14.6%), weak infrastructure and outdated devices (n = 8; 8.3%), a digital divide in rural and remote areas (n = 7; 7.3%), and cybersecurity and data-protection concerns (n = 5; 5.2%). These responses describe an uneven and ageing technical base whose reliability and reach vary across directorates, a pattern that corresponds to the moderate rating of technological infrastructure in Table (5) (q2; mean = 3.49). The disproportionate concentration of network- and divide-related concerns among respondents based in field directorates outside the capital adds a spatial nuance that the aggregated descriptive statistics cannot reveal, indicating that the infrastructural constraint is partly a matter of equitable distribution rather than aggregate provision alone.

Organizational (governance) barriers constituted the third theme, reported by 43 respondents (44.8%) and accounting for 49 coded statements. The leading sub-theme was bureaucratic routine that slows the pace of transformation (n = 12; 12.5%), followed by insufficient funding in the education budget (n = 8; 8.3%), limited awareness of the importance of digital transformation and the absence of a clear vision and strategy (each n = 7; 7.3%), weak support for creative and innovative ideas (n = 6; 6.2%), overlapping powers with other ministries that delay decisions (n = 5; 5.2%), and conflicts of interest and the reluctance of some officials (n = 4; 4.2%). These codes point to structural and procedural features of the institutional environment that slow, rather than wholly prevent, the progress of digital transformation. Notably, although the adoption of a clear, announced strategy was the highest-ranked input in Table (5) (q1; mean = 3.61), a discernible group of respondents nonetheless identified the absence of a clear operational vision and pervasive bureaucratic routine as obstacles, exposing a gap between a strategy that is formally announced and one that is fully operationalised in day-to-day practice.

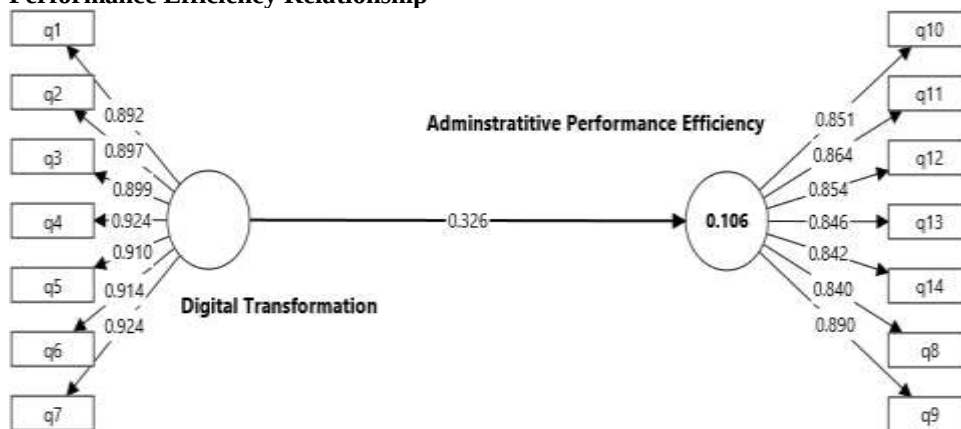
Collectively, the qualitative findings complement and strengthen the subsequent quantitative results. The three themes provide a coherent explanation for why the effect of digital transformation on administrative performance efficiency, although positive and significant, remains modest: a pervasive set of human, technical, and organizational obstacles — led decisively by capacity-related and behavioral

constraints — limits the extent to which digital inputs are converted into realized administrative performance. The direct correspondence between the lowest-rated closed items and the most frequently volunteered barriers lends convergent validity to the measurement of the digital transformation construct and yields a clear, evidence-based hierarchy of priorities for policy, beginning with the development of human capacity.

Measurement Model Assessment

Before testing the structural relationship, the measurement model of digital transformation and administrative performance efficiency was developed and assessed using PLS-SEM in order to confirm that the constructs were measured accurately and reliably. The model and its estimated parameters are displayed in Figure (1).

Figure (1): Measurement Model of the Digital Transformation–administrative Performance Efficiency Relationship



Indicator reliability was examined first. The outer loadings ranged from 0.892 to 0.924 for digital transformation and from 0.840 to 0.890 for administrative performance efficiency, confirming that every indicator explains more than half of its construct's variance. As all loadings exceeded the recommended threshold of 0.70, no indicators were removed and convergent validity at the item level was satisfied (Hair et al., 2022). The individual loadings are reported in Table (8).

Table (8): Indicator Loadings

Digital Transformation		Administrative Performance Efficiency	
Indicator	Loading	Indicator	Loading
q1	0.892	q8	0.840
q2	0.897	q9	0.890
q3	0.899	q10	0.851
q4	0.924	q11	0.864
q5	0.910	q12	0.854
q6	0.914	q13	0.846
q7	0.924	q14	0.842

Internal consistency reliability was assessed next, as reported in Table (9). Cronbach's alpha values were 0.939 for administrative performance efficiency and 0.965 for digital transformation, while the composite reliability coefficients (ρ_a and ρ_c) ranged from 0.947 to 0.971. All values exceeded the 0.70 threshold and remained at or below the critical level of approximately 0.95 for redundancy, indicating excellent reliability without serious concern over item redundancy (Hair et al., 2022).

Table (9): Internal consistency reliability

Construct	Cronbach's alpha	Composite reliability (ρ_a)	Composite reliability (ρ_c)
Administrative Performance Efficiency	0.939	0.947	0.950
Digital Transformation	0.965	0.971	0.971

Convergent and discriminant validity were then examined, as shown in Table (10). Convergent validity was confirmed, since the average variance extracted (AVE) values of 0.732 for administrative performance efficiency and 0.826 for digital transformation exceeded the 0.50 threshold, indicating that each construct explains more than half of the variance of its indicators. Discriminant validity was

established using the Fornell–Larcker criterion: the square root of the AVE for each construct (0.855 and 0.909, on the diagonal) exceeded the inter-construct correlation (0.326), demonstrating that each construct shares more variance with its own indicators than with the other construct (Fornell & Larcker, 1981).

Table (10): Convergent Validity (AVE) and Discriminant Validity (Fornell–Larcker Criterion)

	Administrative Performance Efficiency	Digital Transformation
Average variance extracted (AVE)	0.732	0.826
Administrative Performance Efficiency	0.855	—
Digital Transformation	0.326	0.909

Common Method Bias

As the data for both constructs were collected from the same respondents using a single self-report instrument, the possibility of common method bias (CMB) was examined. Procedurally, respondent anonymity and confidentiality were guaranteed, the items were worded clearly and concisely, and the order of the scales was balanced to reduce response-pattern bias. Statistically, two tests were applied, as summarized in Table (11). Harman’s single-factor test showed that the first unrotated factor accounted for 38.6% of the total variance, well below the 50% threshold, while the full-collinearity assessment of Kock (2015) produced inner-model variance inflation factor (VIF) values of 1.000, below the conservative cutoff of 3.3. Together, these results confirm that common method bias does not threaten the validity of the findings.

Table (11): Common method bias assessment

Procedure	Criterion / threshold	Result	Decision
Harman’s single-factor test	First factor < 50% of variance	38.6% of variance	No CMB
Full collinearity VIF (Kock, 2015)	Inner VIF $\leq$ 3.3	1.000	No CMB

Structural Model Assessment

Multicollinearity was examined by using the variance inflation factor (VIF). The results indicate that the VIF values were within an acceptable range for PLS-SEM analysis. Although some values may approach or slightly exceed conservative thresholds, they remain theoretically justifiable because the items measure closely related aspects of digital transformation, such as leadership support, organizational culture, and innovation. In addition, the indicators were retained because they demonstrated strong factor loadings and acceptable reliability and validity. Therefore, multicollinearity was not considered a serious threat to the interpretation of the structural model. Having confirmed the adequacy of the measurement model, the structural model was evaluated to test the hypothesised effect of digital transformation on administrative performance efficiency. The assessment encompassed collinearity diagnostics, model-fit indices, explanatory and predictive measures, and residual diagnostics, prior to the formal test of the study hypothesis (Hair et al., 2022).

Collinearity among the indicators was assessed using the VIF together with the corresponding tolerance values (tolerance = $1/\text{VIF}$), where VIF values below 5.0 — equivalently, tolerance values above 0.20 — indicate the absence of serious multicollinearity. As reported in Table (12), the VIF values ranged between 2.535 and 5.257, with tolerance values between 0.190 and 0.394.

Table (12): Variance Inflation Factor (VIF) and Tolerance Values of the Indicators

Digital Transformation			Administrative Performance Efficiency		
Indicator	VIF	Tolerance	Indicator	VIF	Tolerance
q1	3.942	0.254	q8	2.535	0.394
q2	4.390	0.228	q9	3.805	0.263
q3	4.033	0.248	q10	2.904	0.344
q4	5.257	0.190	q11	3.060	0.327
q5	4.433	0.226	q12	2.952	0.339
q6	4.779	0.209	q13	3.393	0.295
q7	5.066	0.197	q14	3.605	0.277

Although q4 (VIF = 5.257; tolerance = 0.190) and q7 (VIF = 5.066; tolerance = 0.197) marginally exceed the conservative threshold of 5.0, they remain far below the lenient cutoff of 10 (tolerance > 0.10), indicating only moderate collinearity. Given the strong indicator loadings and the satisfactory reliability and validity results, all indicators were retained while acknowledging this minor collinearity, in line with established SmartPLS guidelines (Henseler et al., 2016).

The fit of the model was then examined, as reported in Table (13). The standardised root mean square residual (SRMR) of 0.047 was below the 0.08 threshold, indicating a small discrepancy between the observed and model-implied correlations, while the normed fit index (NFI) of 0.931 exceeded the acceptable level of 0.90. The low d_ULS (0.228) and d_G (0.171) values further indicate limited residual discrepancies, and the identical chi-square values for the saturated and estimated models reflect stable estimation, confirming an adequate-to-good overall fit (Hair et al., 2022).

Table (13): Model Fit Indices

	Saturated model	Estimated model
SRMR	0.047	0.047
d_ULS	0.228	0.228
d_G	0.171	0.171
Chi-square	294.654	294.654
NFI	0.931	0.931

The explanatory power and effect size of the model are reported in Table (14). Digital transformation explained 10.6% of the variance in administrative performance efficiency ($R^2 = 0.106$; adjusted $R^2 = 0.103$), a modest but meaningful level that is acceptable in exploratory research addressing emerging or complex organizational phenomena. The effect size ($f^2 = 0.119$) exceeded the 0.02 minimum and fell between the cutoffs for small (0.02) and medium (0.15) effects, indicating a small-to-moderate substantive contribution of digital transformation to administrative performance efficiency (Hair et al., 2022).

Table (14): Effect Size (f^2) and Coefficient of Determination (R^2)

Administrative Performance Efficiency	f^2	R^2	R^2 adjusted
Digital Transformation	0.119	0.106	0.103

Predictive relevance was assessed through the PLS predict procedure, as reported in Table (15). All Q^2_{predict} values for the indicators of administrative performance efficiency were positive, ranging from 0.030 to 0.095, which confirms that the structural model possesses out-of-sample predictive relevance relative to a naive benchmark. Although the magnitudes are modest, this level of predictive relevance is considered acceptable for explanatory models of organizational and administrative phenomena (Shmueli et al., 2016).

Table (15): Predictive relevance (Q^2_{predict})

Indicator	Q^2_{predict}
q8	0.095
q9	0.058
q10	0.065
q11	0.095
q12	0.047
q13	0.080
q14	0.030

To further validate the structural estimates, the standardized residuals of the regression of administrative performance efficiency on digital transformation were examined for heteroscedasticity and normality. Although PLS-SEM is a non-parametric, distribution-free technique that relies on bootstrapping and therefore does not require these assumptions (Hair et al., 2022), the diagnostics were conducted for additional assurance, as reported in Table (16).

Table (16): Heteroscedasticity and Normality Tests of the Standardized Residuals

Test	Statistic	df	p-value	Decision
Breusch–Pagan test	$\chi^2 = 2.847$	1	0.092	Homoscedasticity assumed ($p > 0.05$)
White test	$\chi^2 = 4.215$	2	0.122	Homoscedasticity assumed ($p > 0.05$)
Kolmogorov–Smirnov (residuals)	0.041	302	0.200	Residuals approximately normal

The Breusch–Pagan ($\chi^2 = 2.847$, $p = 0.092$) and White ($\chi^2 = 4.215$, $p = 0.122$) statistics were both non-significant at the 0.05 level, so the null hypothesis of homoscedasticity could not be rejected, indicating constant residual variance across the levels of the predictor. The Kolmogorov–Smirnov test (statistic = 0.041, $p = 0.200$) indicated that the standardized residuals did not depart significantly from normality, and inspection of the residual scatterplot and the normal P–P plot confirmed random dispersion around zero with no funnel-shaped pattern. The residual diagnostics therefore support the adequacy of the estimated model.

Hypothesis testing

The study tested a single main hypothesis concerning the effect of digital transformation on the efficiency of administrative performance in the Ministry of Education, formulated in the null form as follows: “There is no statistically significant effect at the level ($\alpha \leq 0.05$) of digital transformation on the efficiency of administrative performance in the Ministry of Education.” The hypothesis was tested using the bootstrapping procedure (5,000 subsamples), and the results are reported in Table (17).

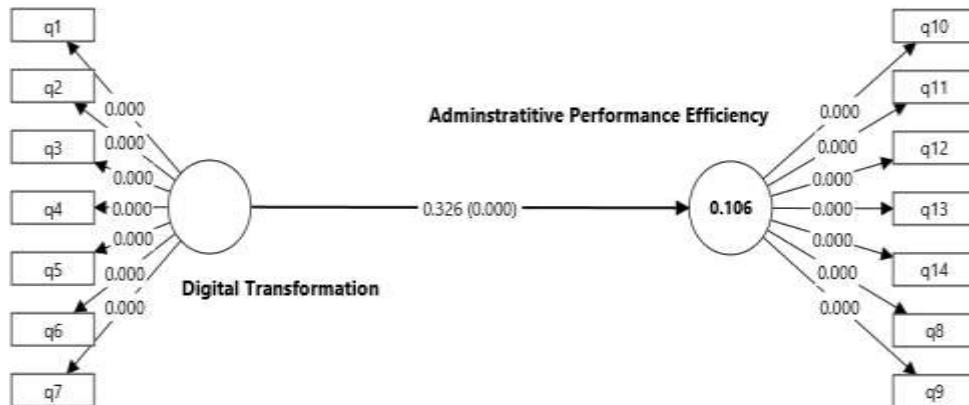
Table (17): Results of the structural path (hypothesis test)

Path	β	Sample mean (M)	Standard deviation (STDEV)	T value	P value	R ²	Decision
Digital Transformation → Administrative Performance Efficiency	0.326	0.333	0.057	5.688	0.000	0.119	Supported

The standardised path coefficient ($\beta = 0.326$) exceeded the minimum practical-significance threshold of 0.10, the t-statistic (5.688) was well above the critical value of 1.96 for a 95% confidence level, and the p-value (< 0.001) confirmed strong statistical significance. The null hypothesis was therefore rejected, establishing a positive and statistically significant effect of digital transformation on administrative performance efficiency. The close correspondence between the samples mean (0.333) and the original sample estimate (0.326), together with a low standard deviation (0.057), indicates a stable and reliable estimate.

The path coefficient shows a positive relationship between digital transformation and administrative performance efficiency ($\beta = 0.326$). This means that improvements in digital transformation are associated with improvements in administrative performance efficiency. The relationship is statistically significant, as the t-value exceeds the recommended threshold and the p-value is less than 0.05. Therefore, the study hypothesis is supported. However, the moderate β value and modest R² indicate that digital transformation contributes to administrative performance efficiency, but other organizational, human, and technical factors also play an important role. The structural model and its estimated parameters are displayed in Figure (2).

Figure (2): Structural model of the digital transformation–administrative performance efficiency relationship, showing the standardized path coefficient ($\beta = 0.326$, $p < 0.001$) and the coefficient of determination ($R^2 = 0.106$)



The R^2 value indicates that digital transformation explains 10.6% of the variance in administrative performance efficiency. Although this explanatory power is modest, it is meaningful in the context of public-sector administration, where performance efficiency is influenced by several additional factors such as leadership practices, organizational culture, human-resource capabilities, financial resources, bureaucratic procedures, and infrastructure readiness. Therefore, digital transformation should be interpreted as a significant contributing factor to administrative performance efficiency, but not as the only determinant of efficiency. This result also supports the practical reality that digital transformation may improve administrative performance only when it is accompanied by sufficient training, infrastructure, leadership support, and institutional readiness.

Discussion:

This study aimed to assess the implementation of digital transformation inside the Jordanian Ministry of Education, to ascertain its impact on administrative performance efficiency, and to identify the barriers obstructing its proper implementation. The results provide a coherent and insightful overview: digital

transformation is being executed at a moderate level, its perceived influence on administrative performance efficiency is substantial, and the structural model validates a positive and statistically significant, albeit modest, effect of digital transformation on administrative performance efficiency ($\beta = 0.326$; $R^2 = 0.106$). The moderate degree of digital transformation implementation (mean = 3.49) signifies that the Ministry is in the setup and maturation phase of its digital progression. Institutional support exists, primarily evidenced by the implementation of a transparent plan and the promotion of initiative; nonetheless, it is inadequate to ensure a high level of application. The lowest-ranked inputs, specifically the continuity of digital training and the supportiveness of organizational culture, indicate that while the announcement of a strategy and the establishment of fundamental infrastructure and leadership provide a positive foundation, they do not, by themselves, ensure comprehensive system integration, a pervasive digital culture, or complete dependence on technological solutions. This assessment aligns with data from similar Jordanian contexts, where the actuality of digital transformation has been observed to fall short of government aspirations (Alsayed & Alassaf, 2023; Alomari, 2024).

The significant perceived influence of digital transformation on administrative performance efficiency (mean = 3.85) indicates that the implementation of digital technologies yields measurable benefits. Respondents indicated significant enhancements in staff productivity, expedited and streamlined administrative processes, and less paperwork, in addition to advancements in service quality and information dissemination. These findings align with a significant corpus of literature indicating that digital transformation improves productivity, service quality, and operational efficiency in public administration (Harahsheh & Al-Oraimi, 2024; Ikwuanusi et al., 2024; Feng & Ali, 2024; Khatir & Madani, 2024). The contrast between a high result rating and a medium input rating is revealing: it indicates that the current limited use of digital tools is already successful, although the inconsistency of that implementation restricts the extent and uniformity of the benefits that may be achieved.

The structural findings enhance this explanation. While the impact of digital transformation on administrative performance efficiency was both positive and significant, the explained variation was limited ($R^2 = 0.106$; $f^2 = 0.119$), indicating

that digital transformation is a legitimate, but not only a factor influencing administrative performance efficiency. This pattern aligns with the perspective that the connection between digital transformation and performance is often mediated by intervening organizational capabilities, including collaborating agility (Xiao et al., 2023), organizational agility (Mahmoud et al., 2025), and innovation-oriented strategy and leadership (Rubio-Andrés et al., 2025). The limited R^2 should be seen not as a deficiency of digital transformation, but as a sign that its complete performance potential depends on supplementary skills that the current single-predictor model fails to include.

The qualitative data elucidate the bounded impact and, through methodological triangulation, enhance the entire narrative (Creswell & Plano Clark, 2018). The prevalence of human (capacity-related) barriers, identified by over three-quarters of respondents to the open question, primarily driven by resistance to change and inconsistent training, aligns closely with the lowest-rated quantitative factors. This suggests that the primary impediment to digital transformation is the workforce's absorptive capacity rather than the accessibility of technology. This convergence reflects previous research indicating that skills deficiencies, reluctance to adapt, and inadequate digital leadership are enduring barriers to digital transformation in institutions within Jordan and other poor nations (Al-Wedyan et al., 2025; Alomari, 2024; Dobrolyubova, 2021). The technical theme introduces a spatial aspect—disparate networks, obsolete devices, and a rural-urban digital divide—that limits the efficacy of digital tools, whereas the organizational theme underscores bureaucratic procedures, funding constraints, and fragmented inter-ministerial authority as systemic impediments that hinder the speed of transformation.

The quantitative and qualitative analyses converge on a clear conclusion: digital transformation significantly enhances administrative performance efficiency, although its effectiveness is now limited by capacity-related, infrastructural, and governance restrictions. The practical implication is that the greatest marginal returns are likely to arise from interventions focused on the human aspect — ongoing, role-specific training, systematic change management, and the intentional cultivation of digital leadership — supplemented by equitable infrastructure provision, targeted funding, and the optimization of bureaucratic processes.

Conclusion, Implications, and Future Research

This study examined the role of digital transformation in enhancing the efficiency of administrative performance in the Jordanian Ministry of Education, using a descriptive–analytical design and a PLS-SEM analysis of data from 302 administrators, complemented by a thematic analysis of an open-ended question. The findings establish that digital transformation is implemented at a medium level, that its perceived impact on administrative performance efficiency is high, and that it exerts a positive and statistically significant effect on administrative performance efficiency ($\beta = 0.326$; $p < 0.001$), albeit with modest explained variance ($R^2 = 0.106$). The qualitative analysis identified human, technical, and organizational barriers — dominated by capacity-related and behavioral constraints — that account for the bounded magnitude of this effect.

Theoretically, the study adds empirical, model-based evidence on the digital transformation–performance relationship in a large public-sector education context that has been under-researched from a quantitative perspective, and it shows the explanatory potential of combining quantitative modelling with qualitative thematic analysis. By connecting the weakest measured inputs to the most commonly reported hurdles; it presents a cohesive, triangulated explanation for why digital transformation produces genuine but incomplete efficiency benefits in this scenario.

The findings practically recommend the Ministry to transit from the foundation stage to a stage of maturity and empowerment. This includes: Developing a cost strategy with clear timelines and performance indicators, fully integrating digital systems within a single platform that enables data exchange, launching continuous, dedicated training and qualification programmers to raise digital skills, proactively upgrading the technical infrastructure while bolstering business-continuity and information-security arrangements, and reviewing organizational structures and financial and administrative regulations to the Ministry should also create digital-performance dashboards to track metrics like time taken to complete transactions and beneficiary satisfaction and link these indicators to institutional planning and assessment to maintain development and to encourage a culture of trust in change.

There are various limitations of the study. It was confined to a single ministry, limiting generalizability of findings to other public sector organizations. Its cross-sectional design limits causal inference. Perceptual, self-reported measures were

used, although the risk of common method bias was assessed and found to be negligible. Moreover, the structural model included one predictor and explained a little amount of the variation, while the qualitative analysis used the subgroup of respondents who answered the open-ended question.

Future research can address these limitations by adopting longitudinal designs to improve causal inference, incorporating mediating and moderating mechanisms such as organizational agility, digital leadership and digital culture to better explain the digital transformation–performance relationship, combining perceptual measures with objective administrative–performance measures, and expanding the analysis to several ministries or comparative public-sector contexts, to improve generalizability.

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