



# The Effect of Digital Transformation on Employee Performance with Mediation Role of Technological Infrastructure: Evidence from Egyptian Oil and Gas Sector

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## Abstract

*The goal of this research is to empirically investigate the effect digital transformation on employees' performance with Mediation Role of technological infrastructure in the Egyptian oil and gas sector. The objectives of this research are: to investigate the relationship between digital transformation and employees' performance, to test the relationship between digital transformation and technological infrastructure, to investigate the relationship between technological infrastructure and employees' performance, and to examine the mediation role of technological infrastructure between digital transformation and employees' performance. The methodology used is focused on quantitative analysis utilizing 401 online survey tool to collect the necessary data and AMOS software for structural equation model analyses (SEM). The study's findings revealed that: all the hypotheses are supported. Finally, the study found that there is a partial mediation effect of the technological infrastructure between digital transformation and employees' performance in Egyptian oil and gas sector.*

**Keywords:** Digital Transformation, Employee Performance, Technological Infrastructure, Oil and Gas, Egypt.

## Introduction

Today organizations have to meet the environmental pressures owing to continuous change in both internal and external environments. This has exacerbated the need for the adoption of new workplace culture by utilizing the organizational learning process to achieve change (Appelbaum et al., 1998; Appelbaum et al., 2017). The oil and gas sector in Egypt has been regarded as the economic engine for both local and global prosperity (EOG-Newspaper-December, 2023). Setting organizational standards is critical to improving employee performance in the oil and gas sector (Bhatti & Qureshi, 2007). However, the Covid-19 pandemic has resulted in current worldwide workforce shortages (Lambovska et al., 2021).

Thus, companies, especially oil firms, want to improved employee performance. To achieve intended employee performance, organizations must establish and convey standards, evaluate performance, and compare actual and standard measurements. Employee dedication, contentment, and productivity may all be used to encourage workers. Lack of recognition, unfair remuneration, inadequate role supposition, and an absence of empowerment all have negative effects on employees' commitment, organizational support, happiness, productivity, organizational citizenship behavior, and leadership role (Rajest et al., 2022). Particularly in the oil and gas industry, non-monetary variables may have an impact on employee performance. Because of this, managers and leaders in different companies concentrate on effective methods to support employee performance long-term (Obiaga & Itakpe, 2021).

This paper aims to investigate the relationship between Digital Transformation and Employee performance with Moderating Roles of Technological Infrastructure in the Egyptian oil and gas sector.

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## Literature Review and Theoretical Framework

Digital Transformation is considered as the independent variable, Technological Infrastructure is considered as the mediator variable and Employee performance is considered as the dependent variable.

### *Digital Transformation (DT)*

Understanding the present notion of digitization requires knowledge of technological developments over the previous few decades. Information and Communication Technologies (ICTs) or ITs where the common term for computer and communication-related developments prior to the advent of digitalization. Information technologies (ITs) are described by Baskerville et al., (2020) as an infrastructure system that provides telecommunications services. ICTs are defined as the technical systems used to transmit, store, process, display, produce, and automate the dispersal of information by Gunday et al., (2011) and Modimogale & Kroeze, (2011), respectively. DT in this paper contains 3 dimensions namely: Digital Pioneering, Digital Mentoring, Organizational facilities.

#### 1- **Digital Pioneering**

Digital pioneering refers to the act of being at the forefront of innovation and advancement in the digital realm. It involves exploring new technologies, developing novel solutions, and pushing the boundaries of what is possible in the digital space. Digital pioneers are individuals or organizations that lead the way in adopting and leveraging digital tools, platforms, and strategies to drive growth, efficiency, and transformation in various industries. They often play a crucial role in shaping the future of digital technology and its applications (Shi & Weber, 2021).

#### 2- **Digital Mentoring**

Mentoring programs demonstrate a strategy for academic staff, organizational employee and sports man etc. (Shi & Weber, 2021). Whereas mentoring can hold a range of meanings and the terminology which shows various set of fundamental assumptions. For instance, literature reveals youth mentoring has been related with programs aiming at teaching, coaching, tutoring, volunteering, counseling, role modeling, and advising (Sachdeva & Malhotra, 2014).

#### 3- **Organizational Facilities**

Every organization in carrying out activities to achieve its goals has several factors that are interconnected and influential. One of these factors is very important to be used to drive the other factor, namely human resources. Therefore, organizations are required to manage and optimize human resources. The human resources to be employed must be professional. Achieving company goals requires employees who are following the requirements in the company, and must also be able to carry out the tasks that have been determined by the. Every company will always try to improve the performance of its employees, with the hope of achieving company goals. (Bikse et al., 2021).

To achieve the goals set by an office, it must be supported by adequate work facilities so that the work process can take place efficiently and effectively. Performance is the implementation of a plan that has been prepared, the implementation of performance is carried out by human resources who have the ability, competence, motivation, and how the organization values and treats human resources which will influence their attitudes and behavior in carrying out their performance (Nicolás-Agustín, 2022).

### *Technological Infrastructure*

According to Fanea-Ivanovici et al., (2020), the term “technical infrastructure” is used to describe the foundation of hardware, software, networks, and other components necessary to maintain and run

an organization's information technology systems. It includes everything the hardware and software a business needs to keep data safe, process it, and send it around. The technical backbone consists of parts like: Hardware is the core of every IT system and comprises things like servers, computers, storage devices, networking equipment, and more. Second, software is what allows the hardware to do what it's supposed to do; it includes things like operating systems, apps, databases, and so on. (Brennen & Reiss, 2016; Ross, 2019; Weill & Woerner, 2018).

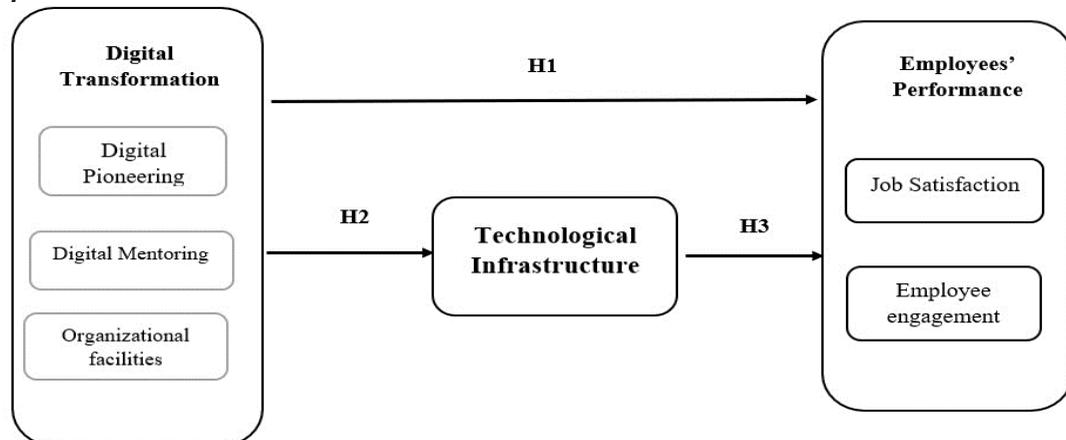
Networks, in this context, are the systems and channels of communication that allow for the sharing of data and information across various nodes and places. Networking hardware such as routers, switches, and hubs are a part of this category. Data centers are specialized buildings that store and handle massive quantities of data using hardware such as servers, storage devices, and networking equipment. The infrastructure for hosting software, websites, and other digital services is provided by data centers. Instead, then depending only on in-house hardware and software, "cloud computing" makes use of outside servers and networks to store, manage, and analyze data (Fanea-Ivanovici et al., 2020). To successfully use technology, support operations, and attain corporate goals, businesses need a solid and well-designed technical infrastructure. It paves the way for the incorporation of numerous digital solutions and services and facilitates effective data administration, smooth communication, trustworthy access to information, and more (Xue et al., 2022).

### ***Employees' Performance***

The term "performance" is used to describe how hardworking, efficient, and successful an organization's employees have been. It includes how much and how well someone works, how well they fulfil their objectives, and how much they provide to the company as a whole. When assessing an employee's performance, several criteria are taken into account. First, you'll need what are called "job-specific skills and competencies," which are the qualities that employers look for in an applicant (Fanea-Ivanovici et al., 2020).

Employees' abilities to interact and work together with their supervisors, peers, and clients are assessed here. The ability to work well with others, communicate well, and contribute to team discussions are all crucial to success (Abolhassan, 2017). Performance management systems and tools are often used by businesses for employee assessment and evaluation. This may include the use of measurements and indicators such as goals and evaluations to gauge progress. Continuous feedback, coaching, training, and growth opportunities are essential to improving employee performance. Organizations may accomplish their strategic goals and boost employee performance by concentrating on increasing their workers' competence, enthusiasm, and commitment (Xue et al., 2022).

### ***Conceptual Framework***



**Figure 1 - Conceptual Framework**

## Research Problem and Questions

According to the digital maturity index of Deloitte, the oil and gas industry is lagging behind the rest sectors in terms of digital transformation (Deloitte, 2020). By opting for digitalization, the oil and gas value chain can revolutionize and improve operational activities helping in enhanced economic results. The pressures from the internal and external forces in terms of lower-carbon alternatives, pressure from price volatility, and increased use of digital technologies (Morgunova & Shaton, 2022). The production of hydrocarbon is the largest industry in Egypt which contributes approximately 24% of the total GDP (Sallam, 2021). The country has witnessed an increase of 17% in the total production of natural gas production and the government is making major investments to boost the sector. Furthermore, the Ministry of Petroleum and Mineral Resources had announced a modernization plan for the sector to become a global leader. They have supported the use of increased digitalization in reporting the data and decision-making process under the Digital Upstream Gateway (International Trade Administration, 2021).

However, the biggest challenge posed to the country is the declining figures of employee labor productivity every year. Recently, the growth in productivity dropped by 3.80% (International Trade Administration, 2021). The major contributor has been the labor movement toward high-productivity activities that use modern technology. According to the Economic Research Forum, the underlying reasons for such low productivity is due to the structural issues and the lack of technical and vocational training. This has a direct impact on employee happiness, productivity, and dedication.

The use of technological advancements like robots, artificial intelligence, virtual reality, etc. has impacted employee performance and the organization (Malik et al., 2021). However, digital transformation is deemed to be a positive skill up-gradation of employees if an employee's psychological contract is enhanced to bring about organizational and employee performance. An employee's psychological contract refers to their expectations of the work environment and job duties in human resource management. Organizations with high employee retention rates are those in which the working conditions and psychological contract are clear (e.g., "our company cares about its part-time workers"), benefits are competitive, and employees have access to training opportunities that help them grow both personally and professionally. These contracts have employee welfare implications, organizational implications, and financial implications, among others (Sandhya & Sulphay, 2019).

The goal is achieved when the expectations of both parties are met, and thus psychological contracts seek to ensure that all parties fulfill their end of the bargain (Alghamdi, 2018). The most common psychological contract breaches include an employee being unfairly treated in some way despite having worked hard or for long enough (e.g., a larger workload with no additional pay), not having any say in how the workplace is managed, or no longer being rewarded for performing well (e.g., poor performance evaluations). As a result, discrepancies between an employee's expectations and the actual quality of his or her work environment can often lead to poor retention rates and create a negative environment for employees in general. (Gike, 2021) This is especially true for those who are more sensitive to unfair treatment. From an ethical standpoint, it is important for management to be open and clear with their employees about what they can expect from their job and the company as a whole. Employees are more likely to be productive when they feel secure and valued (e.g., "heating and cooling systems will work properly"), especially when they see that their input has been taken into account (e.g., "our suggestions will have an impact on how our jobs are managed"). Through the analysis, the organizations and leaders of the oil and gas sector in Egypt will be provided with an effective framework to use in improving employee satisfaction, performance, and retention, which would, in turn, promote economic growth in Egypt.

## Research Questions

- 1- What is the current state of digital transformation in the Egyptian oil and gas sector?
- 2- How does digital transformation impact employee performance in the Egyptian oil and gas sector?

- 3- What is the role of technological infrastructure in mediating the relationship between digital transformation and employee performance in the Egyptian oil and gas sector?
- 4- How does the level of technological infrastructure affect the relationship between digital transformation and employee performance in the Egyptian oil and gas sector?

## Research Objectives

The primary aim of this thesis is to investigate into the relationship between Digital Transformation and Employee performance with Moderating Roles of Technological Infrastructure in the Egyptian oil and gas sector. The study is guided by the following objectives:

- 1- To investigate the relationship between Digital Transformation and Employee performance.
- 2- To examine the relationship between Digital Transformation and Technological Infrastructure.
- 3- To test the relationship between Technological Infrastructure and Employee performance.
- 4- To examine the mediation role of Technological Infrastructure in the relationship between Digital Transformation and Employee performance.

## Research Hypotheses

Based on the conceptual framework, the hypothesized model and reviewing of the related studies and theories, the study hypotheses were formulated as below:

- **H1:** It is expected that Digital Transformation influences Employee performance in the Egyptian oil and gas sector.
- **H2:** It is expected that Digital Transformation influences Technological Infrastructure in the Egyptian oil and gas sector.
- **H3:** It is expected that Technological Infrastructure influences Employee performance in the Egyptian oil and gas sector.
- **H4:** It is expected that Technological Infrastructure mediates the relationship between Digital Transformation and employee performance in the Egyptian oil and gas sector.

## Research Justifications

Employees of Egyptian oil and gas companies are referred to as the research population in this study. The questionnaire was divided in two broad categories. The first category is made up of general information and the second category is the body of the questionnaire that includes three sections: first: digital transformation. Second section: Technological Infrastructure and Third section: employees' performance. A Likert-scale was used to measure opinions.

The research questionnaire was administered to seven hundred (700) respondents, 457 questionnaires representing 65.3% were returned, and 56 questionnaires representing 8% were incomplete or ineligible or refusals and 243 (34.7%) were not reached. There were 401 acceptable responses, a response rate 57.3%, which is highly adequate for the nature of this study.

## Data Analysis

The reliability of a construct in the measurement model is possibly calculated using Composite Reliability (CR). CR determines the consistency of the construct itself and is a more presenting method of overall reliability (Hair et al., 2019). The research result shows the CR of (Digital Pioneering = 0.866, Digital Mentoring = 0.845, Organizational facilities = 0.869, Employee Engagement = 0.838, Technological Infrastructure = 0.934 and Job Satisfaction = 0.922). So, it clearly identified that in measurement model all construct have good reliability.

The Average Variances Extracted AVE should always be above 0.50. (Hair et al., 2019). Overall, the AVE of the particular constructs (Digital Pioneering = 0.626, Digital Mentoring =0.582, Organizational facilities =0.624, Employee engagement =0.586, Technological Infrastructure = 0.779 and Job Satisfaction = 0.702) are more than 0.500. Overall, these measurement results are satisfactory and suggest that it is appropriate to proceed with the evaluation of the structural model.

**Measurement Model Result:** The 6 factor was subjected to CFA using the AMOS software. DF was 260 (it should be more than 0),  $c^2/DF$  has a value of 2.689, that is less than 3.0 (it should be less than or equal 3.0). The RMSEA was .060 (it should be less than 0.08). The TLI index was .941 which is very close to 1.0 (a value of 1.0 indicates perfect fit). The CFI was .948. All indices are close to a value of 1.0 in CFA, indicating that the measurement models provide good support for the factor structure determined through the CFA.

### Structural Model

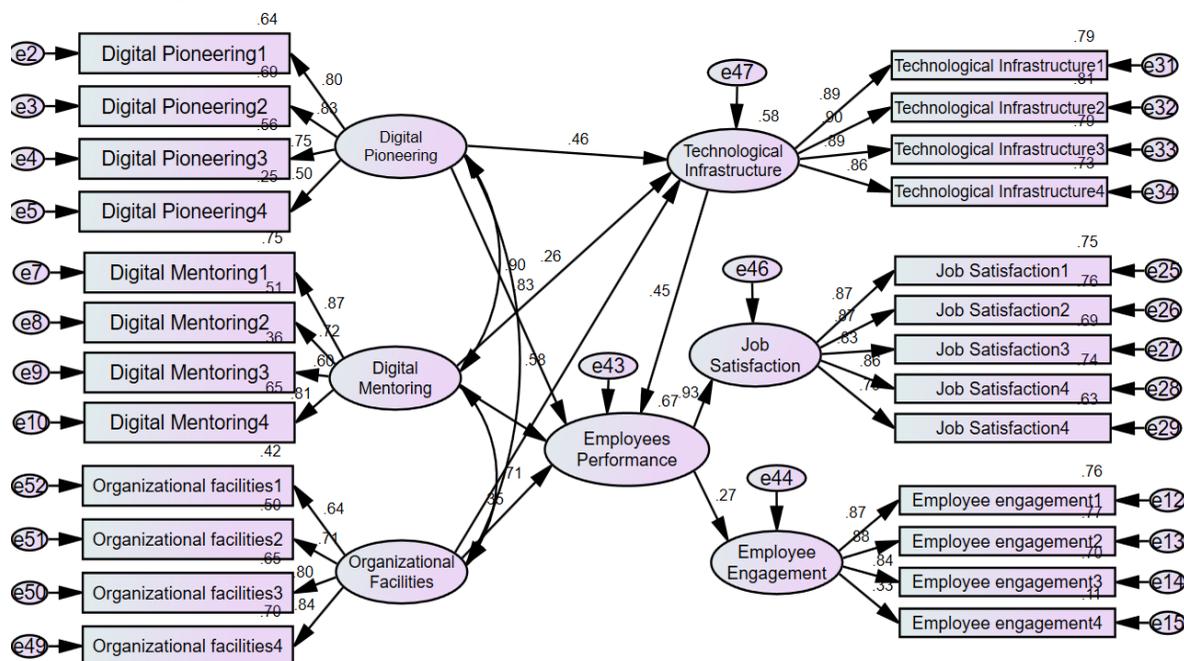


Figure (2) Structural Model

**Structural Model Validity:** The results of structural' model using the AMOS software, shows that DF was 267 (it should be more than 0),  $X^2/DF$  has a value of 2.855, that is less than 3.0 (it should be less than or equal 3.0). The RMSEA was .062 (it should be less than 0.08). The TLI index was .935 which is very close to 1.0 (a value of 1.0 indicates perfect fit). The CFI was .943. All indices are close to a value of 1.0 in CFA, indicating that the measurement models provide good support for the factor structure determined through the CFA.

### Results

The first objective is: to investigate the relationship between digital transformation and employees' performance.

In order to present the results; the individual tests of significance of the relationship between the variables. It reveals that, as expected, a relationship between Digital Pioneering and Employees' Performance ( $\beta = 0.834$ , CR (Critical Ratio) = 28.036,  $CR > 1.96$ ,  $p = 0.000$ ,  $p < 0.05$ ). Therefore, (H1<sub>1</sub>: It is expected that Digital Pioneering influences Employees' Performance in Egyptian oil and gas sector.) is supported.

Moreover, H1<sub>2</sub>: It is expected that Digital Mentoring influences Employees' Performance in Egyptian oil and gas sector. ( $\beta = 0.735$ , CR (Critical Ratio) = 9.357, CR > 1.96, p = 0.000, p < 0.05). is supported.

Further, H1<sub>3</sub>: It is expected that Organizational facilities influences Employees' Performance in Egyptian oil and gas sector. ( $\beta = 0.348$ , CR (Critical Ratio) = 11.848, CR > 1.96, p = 0.000, p < 0.05). Is supported. Based on the results "H1: It is expected that Digital Transformation influences Employees' Performance in Egyptian oil and gas sector" is supported. This is consistent with Wallace (2020) as he emphasized the, One of the most important advantages of digital transformation is that it enables organizations to collect, analyze, and interpret huge amounts of data in real time. This, in turn, enables businesses to make better choices. Moreover, Workers are provided with insightful information that can be utilized to make better choices as a result of the implementation of this data-driven strategy. When workers have access to accurate and up-to-date information on which to make their decisions, there is a possibility that their performance may improve. Agility and Adaptability: As a result of digital transformation, businesses may be able to react more rapidly to shifting conditions in the market and the evolving preferences of their consumers. The ease with which workers are able to incorporate innovative technology, procedures, and practices into their job is a significant factor in the organization's ability to respond quickly to changing conditions. Because of this pliability, workers are in a better position to be able to serve the ever-changing demands of the firm. This is because the organization itself is more adaptable. (Bikse & Colleagues, 2021).

Meanwhile, one of the most common goals of digital transformation is to improve existing customer service. If the staff members have access to the right digital tools and technology, they may be able to play an important part in providing excellent experiences for the consumers. If firms provide their workers access to the digital tools, they need to do their jobs well, such businesses may be able to deliver better service to their customers and reach greater levels of success (Gruia et al., 2022).

The second objective: is to test the relationship between digital transformation and Technological Infrastructure.

Moreover, the result shows that: H2<sub>1</sub>: It is expected that Digital Pioneering influences Technological Infrastructure in Egyptian oil and gas sector. ( $\beta = 0.458$ , CR (Critical Ratio) = 1.980, CR > 1.96, p = 0.048, p < 0.05). Is supported.

Moreover, H2<sub>2</sub>: It is expected that Digital Mentoring influences Technological Infrastructure in Egyptian oil and gas sector. ( $\beta = 0.261$ , CR (Critical Ratio) = 17.976, CR > 1.96, p = 0.000, p < 0.05). Is supported.

Further, H2<sub>3</sub>: It is expected that Organizational facilities influences Technological Infrastructure in Egyptian oil and gas sector. ( $\beta = 0.287$ , CR (Critical Ratio) = 7.172, CR > 1.96, p = 0.000, p < 0.05). Is supported.

Based on the above results, "H2: It is expected that Digital Transformation influences Technological Infrastructure in Egyptian oil and gas sector" is supported. In most cases, the successful deployment of digital disruption calls for the use of a reliable technical foundation. It provides access to all of the tools, scalability, data management capabilities, integration support, and safety precautions that it need to guarantee the success of the digital efforts. To successfully traverse the digital world and make the most of the opportunities presented by digital transformation, businesses need to make investments in a technology foundation that is not just adaptable but also strong (Kutnjak et al., 2019). The oil and gas industry of Egypt's technology infrastructure has been considerably influenced by the digital revolution in recent years. This change has occurred over the course of many years. The countless new innovations and adjustments that have been accessible as a consequence of this shift have resulted in a profound upheaval in the manner in which businesses function in the present day (Gruia et al., 2022).

Moreover, Kutnjak et al., (2019) assessed that, all of the necessary resources for achieving digital transformation are made available by the underlying infrastructure of technology. It is the backbone that enables the deployment of digital technologies and the free movement of data and information across

different systems and operations. As a consequence of digital transformation, massive volumes of data are being generated, and the underlying technological infrastructure has to have the capacity to both handle and analyze this data. Because of their ability to store the data, process the data, and analyze the data, businesses are able to get insights from their data and make choices based on the data. Companies need to have robust data management systems in place if they wish to increase the efficiency of their internal operations, tailor their goods and services to the particular requirements of their customers, and locate untapped market niches (Kutnjak et al., 2019). For instance: connectivity, application programming interfaces (APIs), and middleware are all examples of components that are included in the technical infrastructure that contribute to the realization of this integration within the digital ecosystem. These are all examples of components that are included in the technical infrastructure that are included in the digital ecosystem. As a direct consequence of this connection, companies now have the capacity to raise their level of productivity, foster a greater spirit of cooperation, and provide a user experience that is uniform across all channels (Bikse et al., 2021).

The third objective is: to examine the relationship between Technological Infrastructure and employees' performance.

The result shows that **H3**: It is expected that Technological Infrastructure influences Employees' Performance in Egyptian oil and gas sector. ( $\beta = 0.452$ , CR (Critical Ratio) = 2.751, CR > 1.96,  $p = 0.006$ ,  $p < 0.05$ ) is supported. According to Vial, (2021), the use of efficient digital platforms and channels of communication enables organizations and the many teams and divisions that make up such organizations to collaborate more effectively. This makes it possible for enhanced effectiveness in areas like as collaboration, the sharing of information, and the settlement of issues. In addition to that, it may be possible to increase worker safety in the oil and gas business by implementing technical infrastructure, such as monitoring systems and sensors. Workers have the ability to protect themselves from potential dangers and respond appropriately in the case of an emergency if they have access to up-to-date safety data (Xue et al., 2022).

Moreover, technology advancements have made it feasible to make decisions based on data by simplifying the process of gathering, analyzing, and displaying large amounts of information. This has made data-driven decision making possible. The employees will then be able to draw conclusions based on the data, identify patterns, and improve processes to increase the output quality (Stark, 2020).

The fourth objective is: to investigate the mediation role of Technological Infrastructure between digital transformation and employees' performance.

Based on the results, a statistically significant indirect effect between Digital Pioneering and Employees' Performance through Technological Infrastructure ( $P = 0.002$ ,  $P < 0.05$ ). The results of the mediation effect indicate that there is partial mediation effect of the Technological Infrastructure between the relationship of Digital Pioneering and Employees' Performance. Moreover, a statistically significant indirect effect between Digital Mentoring and Employees' Performance Through Technological Infrastructure ( $P = 0.003$ ,  $P < 0.05$ ), The results of the mediation effect indicate that there is partial mediation effect of the Technological Infrastructure between the relationship of Digital Mentoring and Employees' Performance. Further, a statistically significant indirect effect between Organizational facilities and Employees' Performance through Technological Infrastructure ( $P = 0.003$ ,  $P < 0.05$ ), the results of the mediation effect indicate that there is partial mediation effect of the Technological Infrastructure between the relationship of Organizational facilities and Employees' Performance.

Based on the above, Technological Infrastructure partially mediates the relationship between Digital Transformation and Employees' Performance in Egyptian oil and gas sector. According to Fanea-Ivanovici et al., (2020), the ability of a technology infrastructure to connect and integrate a wide variety of digital systems and applications is also crucial to the role of the infrastructure as a mediator. If they are backed by a robust infrastructure that enables the free flow of information between them, enterprise resource

planning (ERP) systems, customer relationship management (CRM) platforms, and data analytics tools may all function together in harmony. Employees may now access and assess data from a wide range of sources, giving them the ability to make more informed decisions and increasing the overall output of their work. Additionally, in order to guarantee their scalability and flexibility, initiatives involving digital transformation need a rock-solid basis in terms of technology.

The evolving nature of oil and gas firms' enterprises inevitably results in a shift in their requirements and preferences towards digital tools. It is possible that the expansion of digital solutions will be backed by a well-planned infrastructure, which will provide employees with simple access to the tools they need to adapt to the changing demands of the organization. Workers are able to properly do their duties despite the constantly shifting circumstances because to the flexibility and scalability of the system (Xue et al., 2022).

Effective technology infrastructure allows for unhindered interaction and cooperation amongst workers. Employees are able to more effectively exchange knowledge, work together on projects, and consult with one another thanks to digital platforms and tools. Teamwork, information exchange, and the ability to solve problems are all boosted as a result. In addition, the industry benefits from a solid technical foundation, which facilitates the introduction of automation and robots. Streamlining routine procedures in this way may help cut down on mistakes made by humans and boost output. When workers are freed up to concentrate on tasks with a higher level of complexity and more value, productivity rises (Gruia et al., 2022).

## Conclusion

The focus of this research is to investigate into the relationship between digital transformation and employees' performance in the Egyptian oil and gas companies with the role of technological infrastructure as a mediating variable. The study used a quantitative correlational methodology to obtain primary sample data from 401 sample. The analysis reveals that:

- 1- The direct effect between digital transformation and Employees' Performance is statistically significant.
- 2- The direct effect Digital transformation and Technological Infrastructure is statistically significant.
- 3- The direct effect between Technological Infrastructure and Employees' Performance is statistically significant.
- 4- Technological Infrastructure partially mediates the relationship between Digital Transformation and Employees' Performance in Egyptian oil and gas sector.

## Authors Contributions

This research paper has dual significance. Academically, it has fulfilled the research gap in literature and examined the relationship between digital transformation and employees' performance through technological infrastructure in the Egyptian oil and gas sector. According to the analysis, at the 5% significance threshold, all are considered significant. the estimated structural model corroborated the seven hypotheses, as Digital Transformation (Digital Pioneering, Digital Mentoring and Organizational facilities) construct explained 57.9 % of Technological Infrastructure variance ( $R^2 = 0.579$ ), Besides, Digital Transformation (Digital Pioneering, Digital Mentoring and Organizational facilities) through Technological Infrastructure explained 66.5 % of Employees' Performance variance ( $R^2 = 0.665$ ).

Practically, the trade-off involved in the implementation is considered the extensive training to engage employees and drive adaption and a broader cultural change. Leadership development is needed to foster an aspirational outlook, with managers acting as change agents. In addition, the digital transformation program is also a prerequisite for research, goal development and future action plans for the future advanced oil and gas field management programs in the Egyptian oil and gas companies, such as: (1) predictive maintenance

program (predictive maintenance); (2) program asset performance management and technology system optimization (process optimization); and (3) enterprise performance management program.

### Research Limitations

This paper has various limitations such as:

This study is conducted in one country (Egypt) and one sector (oil and gas). In spite of the fact that the research was conducted in a very specialized context, it is believed that the findings can be applied to a variety of other sectors, industries, and countries.

A cross-sectional data was used in this study to examine the relationship psychological empowerment, job satisfaction and performance in the Egyptian oil and gas sector. This suggests that the findings of the research are only useful under certain conditions, including when external factors such as governmental regulations, economic activity, the competitive climate, and so on are unaffected.

The data gathering from respondents over a set period of time utilizing a convenience sample approach had its limitations. The scope of potential responders was constrained by the short time span for data gathering. So, it is recommended for future research to collect data using a probability sampling technique

### Future Research Suggestions

The following areas for further investigation are suggested based on the findings of this study:

- **First**, because the sample was limited to only Egyptian oil and gas sector, a sample derived from other sectors, industries would improve the generalizability of the findings in the future.
- **Second**, a longitudinal study should be done to examine the long-term relationship between digital transformation and performance in the Egyptian oil and gas, with the mediating role of technological infrastructure.
- **Third**, a study should be undertaken utilizing a qualitative technique or a mixed strategy using both qualitative and quantitative approaches.

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