

Change Management as a Mediating Variable on the Relationship between Digital Transformation and Project Management Efficiency

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Abstract Purpose: This study is one of the requirements for preparing a professional doctoral dissertation on digital transformation, change management, and project management applied to the private electricity sector in Egypt. **Aim and objectives:** Describe the extent of the reality of the Digital Transformation of the private Electricity sector in Egypt. Disclosure of the interest in the Electricity sector in Egypt to benefit from Digital Transformation in achieving Change Management. Determining the extent of interest in our Electricity sector in Egypt to benefit from Digital Transformation in Project Management Efficiency. Identify the extent of Change Management with achieving Project Management Efficiency in the Electricity sector in Egypt. Determining the extent of the impact of Digital Transformation on Project Management Efficiency through Change Management in the Electricity sector in Egypt. **Hypothesis:** Based on the empirical literature, the model expressed the digital transformation relationship as an independent variable that consists of three basic dimensions including (Employee Digital Skills (DS) - Digital Transformation Strategy (DTS) - Digital Technology (DT). change management as an intermediate variable uses the ADKAR model to investigate the role of each change management which consists of main dimensions (Awareness- Desire- Knowledge- Ability- Reinforcement). Finally, the principles of project management as a dependent variable and it consists of the following dimensions (Company's main features- Project management process-Project, Program, and Portfolio Performance). **Design/methodology/approach:** Depending on the nature of the subject of the study and the information that must be obtained to reveal the effect of Digital Transformation (as an independent variable) on Project Management Efficiency (as a dependent variable), Change Management as a mediator variable and through the questions that the study seeks to answer, this study relied on the descriptive analytical approach, data were collected in the field through the survey list in the field study to test the validity of the assumptions on which the study was based. By obtaining this data from employees in the Electricity sector companies in Egypt. **Main results:** The study found There is a statistically significant impact of Digital Transformation on Change Management in the Electricity sector in Egypt the study found There is a statistically significant effect of Change Management on the Project Management Efficiency of the Electricity sector in Egypt. The study found that Digital Transformation has a statistically significant impact on Project Management Efficiency in the Electricity sector in Egypt. The study found that Digital Transformation has a statistically significant impact on Project Management Efficiency through Change Management in the Electricity sector in Egypt. **Recommendation:** Working to support Change Management through Ensure that workers are aware of the objectives of change in companies. That all workers have ample opportunities in the process of change. Ensure that employees have clarity about change. Working to support Digital Transformation through: Companies provide employees with resources or opportunities to acquire digital skills appropriate for digital transformation. Companies are interested in providing employees with resources or opportunities to acquire digital skills appropriate for digital transformation. Work to support Project Management Efficiency through Ensure that communication flows mainly between similar hierarchical levels. Ensure that all projects use the project management information system.

Keywords: digital transformation, project management efficiency, change management, private electricity sector in Egypt

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1. Introduction

The current organizations face many pressures and challenges, mainly due to those rapid and successive fundamental changes - especially with the beginning of the twenty-first century - that the surrounding business environment is witnessing, as it is now dominated by volatility and dynamic change, the world has become dominated by globalization and the laws of the market economy. This is due to scientific revolutions and recent discoveries, in addition to the technological advancement that characterized this change and the subsequent advances in communications, computers, and information technology (Flanding et al., 2018) [1].

The concept of digital transformation has become one of the most growing and widespread concepts around the world at the present time, especially in light of the successive developments in the field of communications and information technology, in this context, investment in digital transformation has become an integral part of the work of organizations, by relying on modern technological. Such as artificial intelligence, digital platforms, the provision of big data, and other modern technological (Raymond et al., 2020) [2].

Change is inevitable and necessary and a continuous and renewable process, a feature of the modern era due to the developments witnessed and witnessed by this era, successive and rapid changes in various fields of human knowledge, starting with the industrial revolution and ending with the information revolution and the communications revolution, which necessarily affected all fields and affected countries Developed or developing with this rapid reality of change (Vuorinen et al., 2019) [3].

Therefore, it can be emphasized that the constant in existence is the planned change in order to improve the effectiveness of the administration, i.e. specifically the development management apparatus and the strengthening of the possibility of facing the problems facing this administration, meaning it is a long-term plan to improve the performance of the administration, relying on a cooperative method in a way in which members of the organization participate in a way on the one hand, taking into account the environment in which the administration operates and the scientific application of behavioral sciences related to the development of psychological trends of employees and the development of their skills and their willingness to learn and accept change and the development of dealing with each other, initiative and innovation, so the planned change has gained the attention of researchers in the field of work of organizations due to what it involves. It has to do with planning of the role and importance in improving the effectiveness and efficiency of the organization (Oboreh et al., 2019) [4].

Project management is important because it brings leadership and direction to projects. Without project management, a team can be like a ship without rudders but without direction, control, or purpose. Leadership enables the team to do its best job. Project management provides leadership, vision, motivation, breaking down roadblocks,

coaching, and inspiring the team to do their best job (Vuorinen et al., 2019) [3].

The traditional energy system as we know it; From generation to consumption, it is becoming more complex as the world needs clean, reliable electricity at economical prices. In order for power transmission and distribution facility operators to be successful in our changing world, they must be able to continually adjust and improve their operational processes, so the solution lies in digital transformation (Gomez-Trujillo et al., 2021) [5].

Egypt is currently going through a phase of transformation for the electricity sector, as the sector continues to move towards a future in which the energy system depends on digital solutions and high-speed communication systems. As the share of renewable energy increases, digital technology provides an increased level of intelligence to all types of energy suppliers and consumers, especially power grids (Ibrahiem et al., 2022) [6].

In the current situation, new power plants are designed digitally, which ensures the efficiency of their services and their high availability. Digital twin technology may be used to help with modeling, forecasting, and testing the optimal performance, both for the generation, transmission, and distribution sectors, down to the customers (Dellermann et al., 2017) [7]. The basic need is to install sensitive sensors and smart meters throughout the electrical grid in order to create smart grids, linking entire systems together for the purpose of achieving digitization (Ibrahiem et al., 2022) [6]. Finally, digital transformation is a critical component of the energy industry transformation, which will allow for the integration of more renewable energy technologies throughout the electrical system, raise grid reliability, and help better manage energy demand.

Based on the above, it is clear that there is of utmost importance to work on caring for Digital Transformation in addition to supporting Change Management to achieve Project Management Efficiency. Therefore, this study will attempt to reach a framework through which this relationship can be utilized in business organizations, by applying it to the Electricity sector in Egypt.

1.1. Research Problem

Due to the rapid and continuous change in the work environment, the emergence of many global challenges represented by technical development, attention to the surrounding environment, and teamwork, which led to an increase in the need for administrative skills capable of outstanding performance and increased interest in human resource development (Brunetti et al., 2020) [8] & (Oboreh et al., 2019) [4] so that organizations can survive and continue in light of the successive environmental changes. The work environment is an important requirement for success, solving multiple administrative problems and helping to deal with challenges.

According to this challenge, the Electricity sector in Egypt needs to pay attention to the means and strategies that achieve excellence. At the level of all company sectors. One of the most important of these means is working to provide the elements of Digital Transformation, as many previous studies have shown that Digital

Transformation has positive results in terms of performance, competitiveness, facing challenges, changes, and Project Management Efficiency.

Also, traditional methods are no longer appropriate in light of contemporary environmental conditions and changes, this requires the electricity sector to search for everything that achieves their strategies and helps them achieve the highest levels of excellence in the performance of their work.

1.2. Research Gab

The current study agrees with the study (Salib, Mariam, 2020) [9] in dealing with the issue of digital transformation as an independent variable, but it differs in terms of the dependent variable, which is innovation performance, operational performance, and project performance, it differs in terms of the applied field, which is the Egyptian projects. It agrees with the study (Abdulquadri, et al ., 2021) [10] in dealing with the issue of digital transformation as an independent variable, but it differs in terms of the dependent variable, which is the provision of financial services, it differs in terms of the applied field, which is the banking sector in Nigeria. It agrees with the study of Pisoni, G. (2021), [11] in dealing with the issue of digital transformation as an independent variable, but it differs in terms of the applied field, which is the Italian insurance companies.

A review of previous studies revealed that there are some studies that dealt with change management in the relationship and impact with some other variables, the most important of which are: quality management as in the study (Haffar, et al., 2019) [12], transformational leadership, as in the study (Yue et al., 2019) [13], the organizational climate in a study, (Elīna Gaile-Sarkane, (2015) [14].

A review of previous studies revealed that there is diversity in the applied fields, but there was a shortage and deficiency in dealing with the Electricity sector. So, the research gap is as follows:

- Deficiency in the study of the Digital Transformation the in Electricity sector.
- Deficiency in the study of Change Management in the Electricity sector.
- Deficiency in the study of Project Management Efficiency in the Electricity sector.
- Deficiencies in the study of Digital Transformation and its impact on Change Management satisfaction in the Electricity sector.
- Deficiency in the study the Digital Transformation and its impact on Project Management Efficiency in the Electricity sector.

Therefore, the current study will address this deficiency by addressing the issue of Digital Transformation and its relationship to Change Management and Project Management Efficiency, specifically in the Electricity sector in Egypt.

1.3. Research Significance

- The importance of this study lies in an attempt to contribute to bridging the research gap in studies and research on the concept of Digital

Transformation, specifically with regard to organizational practices that contribute to achieving Change Management and Project Management Efficiency. The study is also a response to what many previous studies have called for in conducting More studies and research on these topics, and their great importance in enriching the academic library and scientific research centers, especially those interested in administrative studies. This study could also provide a database to help researchers and scientists to conduct more research in this area.

- The study is related to the importance of the Electricity sector as a fundamental pillar that contributes to improving the lives of citizens, given its overlap in all aspects of life, by achieving a qualitative leap in Egyptian society through the localization of technology and the use of its latest systems in the various governorates of Egypt, facilitating and developing the efficiency of government services, providing an environment that encourages On building the capabilities of youth and providing job opportunities by establishing mega projects and increasing investment in this vital sector. Digital technologies are evolving at an unprecedented speed, transforming and developing entire sectors, and accelerating the changes needed to create a cleaner and more sustainable energy future.

1.4. Research Objectives

The main objective of this research is to study and test the effects and the relationships of the following variables:

1. To examine the relationship between Digital Transformation and Change Management.
2. To examine the relationship between Digital Transformation and Project Management Efficiency.
3. To investigate the relationship between Change Management and Project Management Efficiency.
4. To investigate the extent of the impact of Digital Transformation on Project Management Efficiency through Change Management of the Electricity sector in Egypt.

1.5. Research Questions

Based on the research objectives, the research formulates the following key questions:

1. What is the relationship between Digital Transformation and Change Management in the companies under study?
2. What is the relationship between Digital Transformation and Project Management Efficiency in the companies under study?
3. What is the relationship between Change Management and Project Management Efficiency in the companies under study?
4. What is the relationship between Digital Transformation and Project Management Efficiency through Change Management in the companies under study?

2. Literature Review

2.1. Digital Transformation

2.1.1. Digital Transformation Definitions

Digital transformation is to take advantage of the information and communication revolution to provide services and products in an innovative way that generates a distinctive experience at all levels, as the citizen or consumer service is the axis on which the study of the business model, innovation and digital development is based with the aim of creating new value based on the development of procedures and their compatibility with policies and legislation global laws and rules (Steiber, A. & Alänge, S. 2021) [15].

Digital transformation is broadly defined as the integration of digital technologies into all areas of business, optimizing existing processes, creating new ones, and delivering greater value to customers. It represents a cultural shift to more flexible and smarter ways of doing business, powered by technologies such as advanced analytics and artificial intelligence (Brunetti et al., 2020) [8].

Digital Transformation: The process of transforming the business model of government organizations or private sector companies into a model based on digital technologies in providing services, manufacturing products, and managing human resources (Dorfleitner et al., 2021) [16]. Digital transformation represents a process of changing the structure of companies, and is related to the use of technology and facilities of the digital medium to modify internal and external processes, and improve the customer experience (Abdulquadri, et al., 2021) [10].

The aforementioned concepts about digital transformation immediately clear to us the many and varied benefits of digital transformation, not only for customers and the public but for government organizations and companies as well, including that it significantly saves cost and effort, improves and organizes operational efficiency, improves quality and simplifies procedures for obtaining services provided to beneficiaries. It also creates opportunities to provide innovative and creative services away from traditional ways of providing services, digital transformation helps government organizations and companies to expand and spread in a wider range and reach a larger segment of customers and the public.

2.1.2. Digital Transformation Benefits / Importance

The astonishing development in devices, machines, and smart systems will lead to shortening time, reducing costs, achieving greater flexibility and more efficiency in the production process, and a great capacity in data processing and artificial intelligence. There is no doubt that these developments will widen the scope of development and change and the occurrence of unprecedented transformations in the economy, the labor market and the industrial sector (Abdulquadri, et al., 2021) [10]. Digital transformation represents one of the most important drivers and catalysts for growth in major companies and government departments, which imposes on companies a decisive race to develop innovative solutions that ensure

their continuity in the cycle of competition (Herbert, L. (2017) [17].

2.1.3. Previous Studies / Theoretical Models (Critical Analysis)

According to (Vendraminelli et al., 2020) [18] the purpose of the study is to frame a design-driven approach to planning and implementing digital transformation. This study focuses on an in-depth case study of a large Italian company in the fashion sector that adopted design thinking to formulate its digital transformation strategy and turn it into a list of projects to be implemented. Drawing on design theories, the authors formulated a three-stage process (understanding the reality, defining the digital transformation strategy, and transforming the digital transformation strategy into digital projects). The framework provides a structure to manage digital transformation through strategy development and implementation. Furthermore, practitioners and companies can assess whether their digital transformation process is under control and reflect on whether they are paying appropriate attention to each of the three identified stages. They can follow in the footsteps of EYEWEAR and adopt the proposed framework to design their company's digital transformation process.

2.2. Project Management Efficiency

2.2.1. Project Management Efficiency Definition

Project management according to the Project Management Association (UK) is the application of processes, methods, skills, knowledge, and experience to achieve project objectives defined in accordance with project acceptance criteria within the agreed criteria. Project management has end deliverables constrained by a limited time and budget (Bushuyev, S. & Friedrich Wagner, R. 2014) [19].

Project management is defined as: "a set of organized activities directed towards optimal employment and better utilization of appropriate resources aimed at achieving clearly defined project objectives, based on various methods, sufficiency, and effectiveness, within a specific set of conditions or constraints" (Phung, Q., Erdogan, B. & Nielsen, Y. (2022), [20].

Project management: means a group of events and activities that work with each other from planning, organizing, directing, and controlling for the purpose of optimal use of the project's capabilities with the aim of achieving its objectives efficiently and effectively and within the standards of the time, cost, quality, provided that this management takes into account the various environmental factors and variables surrounding the project (Hermano, V., Martin-Cruz, N. & Pajares, J. (2022) [21].

Project management can also be defined: it is the application of knowledge, skills, tools and technical methods to project activities to achieve project requirements, project management is achieved by applying and integrating project management processes from initiation, planning, implementation, monitoring, control, and termination of the project, that the project

manager is the person responsible for achieving the project objectives (Rengel Jara et al., 2019) [22].

Based on the foregoing, it can be concluded that project management means: the processes of planning, directing, organizing, and controlling various resources; In order to reach certain goals, within a specified period of time.

2.2.2. Project Management Efficiency Benefits / Importance

The existence of successful project management means in addition to maintaining the main project objectives in terms of scope of work, schedule and budget (or what is known as the quality triangle), as such management ensures the unification of the vision between the client or the end user and the implementation team and creates a vision for success and puts everyone on the same page for what is required to stay on track (Sommerville, et al., (2010), [23].

2.2.3. Previous Studies / Theoretical Model (Critical Analysis)

The study (Hermano et al., 2022) [21] aimed to shed light on the outputs of the dynamic capabilities of project management (PM). The study also examines the impact of dynamic capabilities on the performance of the company, directly and indirectly, through the effect of mediation on project performance and maintenance. It also tests whether program performance might mediate the relationship as well. The study was tested with a sample of 63 international companies involved in projects worldwide.

The study found that dynamic capabilities do not directly affect company performance but do so indirectly by increasing companies' performance in projects, programs and portfolios. Both project and portfolio performance have a mediating effect on the relationship between dynamic capabilities and company performance, but portfolio performance absorbs all of this effect when both performances are in the model. The study sheds light on the link between dynamic capabilities and company performance. The real result of dynamic capabilities was tested by clearly distinguishing between the performance of the company at three intermediate levels (project, program and portfolio) and the overall performance of the company. The dynamic capabilities black box is opened and experimentally runs on the theoretical model of sensing and transfer capture as the three actions that make up the dynamic capabilities.

The purpose of the study (Rengel Jara et al., 2019) [22] is to understand the scope of the project management curriculum in university hospitality programs, to understand the scope of project management skills requirements in hospitality companies and to narrow the gap between project management in academia and hospitality companies. The results show that there is a disconnect between the project management curriculum in schools and the demand for project management skills in the hospitality industry. Research should encourage schools to invest appropriate resources in the curricula required for project management. The hospitality industry is vast in the types of businesses it falls under. Project management is one of the skill sets that can come in handy in most different businesses in the hospitality industry. From a practical point of view, providing students with a solid background in the project management discipline

provides them with an advantage in the highly competitive hospitality industry. It achieves this by providing students with the required knowledge and competencies that are globally accepted and highly valued by hospitality management companies as a skill set widely used in the industry.

2.3. Change Management

2.3.1. Change Management Definition

Change is defined as directed, intentional, purposeful, and conscious change that seeks to achieve internal and external environmental adaptation, in order to ensure the transition to a desirable state that is more capable of solving problems. It is a process of tangible change in the behavioral pattern of employees, a radical change in the organizational behavior to comply with the requirements and climate of the internal and external organizational environment (Gondo et al., 2014) [24].

Change management also refers to the administration's move to confront new situations so as to benefit from the factors of positive change. It is a dynamic movement using new methods and methods resulting from intellectual and material innovations, represents hopes and dreams for some and pain and disappointment for others, according to technical and psychological readiness (Bhattacharya et al., 2012) [25].

Organizational change is a process of tangible change in the behavioral pattern of employees and a radical change in the organizational behavior to comply with the requirements of the internal and external organizational climate and environment, that the end result of changing organizational behavior is its development (Oboreh et al., 2019) [4].

Change is defined as the process of shifting from the current reality of an individual or organization to another desired reality within a specified period of time, by known methods and methods to achieve certain goals, it is a planned or unplanned response by humanitarian organizations to the pressures left by progress and technical development in materials and ideas (Haffar et al., 2019) [12].

Accordingly, the research can define change management as pre-preparation by providing technical, behavioral, administrative and cognitive skills to use the available resources (human, legal, material, time) efficiently and effectively, to shift from the current reality to the desired future reality during a specified period with the least possible negatives for individuals and institutions in the shortest time and the least effort and cost.

2.3.2. Change Management Benefits / Importance

The importance of change as a way of life within the organization is that the only thing that remains constant over time is change. Therefore, managers and employees in the organization must be constantly prepared to accept the change process in light of the surrounding global conditions represented by globalization and comprehensive quality management and diversity in the workplace, what is related to It has a moral and social responsibility and other environmental variables that impose this (Oboreh et al ., 2019) [4].

The advancement of institutions is the correct starting point for any development or progress sought by nations seeking progress, change is an inevitable matter imposed by accelerated conditions of change that include all areas of life (Malhotra, N. & Hinings, B. 2012) [26]. The forces of globalization, the rapid growth in scientific knowledge, advances in communication technology, the dissemination and application of knowledge, the need to pay attention to the approach to restructuring to develop institutions to cope with these changes (Gupta, V.K. 2016) [27].

2.3.3. Change Management Previous Studies / Theoretical Framework (Critical Analysis)

The aim of the study (Zubac et al., 2021), [28] is to better understand the strategy and interface to change, in particular the (sub) processes and perceptions that enable strategies to be successfully implemented and to effectively change organizations. The study sheds light on strategy and the interface to change in very different ways. . Collectively, the study give us insight into the activities, structural and organizational learning and cognitive mechanisms that are encouraged or deliberately created in organizations to allow their employees to successfully implement strategy and effect change, including achieving higher levels of horizontal alignment. Furthermore, they demonstrate the benefits associated with creating platforms and/or routines designed to overcome the knowledge deficiencies of decision makers while implementing or making adjustments to a strategy in a timely manner. We conclude our editorial by identifying some of the unanswered questions.

2.4. Digital Transformation and Change Management

There is no doubt that these developments will widen the scope of development and change and the occurrence of unprecedented transformations in the economy, the labor market and the industrial sector, as digital transformation represents one of the most important drivers and catalysts for growth in major companies and government departments, which imposes on companies a decisive race to develop innovative solutions that ensure their continuity In the circle of competition (Crawford et al., 2010) [29].

Successful digital transformation means that employees use faster and more flexible work mechanisms to unlock innovation, deliver services quickly to customers, reduce costs in the event of failure (Dellermann et al., 2017) [7]. This means: using automation as a standard work item, specifically for network management, print management, security, processes in tools, so employees have to follow them as part of the work, documentation and compliance in tools to ensure they are followed, using desirable behaviors, such as internal collaboration, in Performance management Create processes to reinforce desirable behaviors, use of technology, ways of working, such as traces of past events Weekly to discuss how technology has been used and what might be best (Malhotra et al., 2012) [26].

In general, technological change comes in the context of ideas and initiatives that come from lower organizational levels to go to higher levels for approval

and follow-up implementation. Here, the technological expertise of employees at the lower levels plays as heroes or pioneers of ideas to induce important technological changes in the field of work. This appears in organizations that adopt decentralization in their structure, they are more flexible organizations and employees have great freedom to pursue opportunities and continuous improvements (Stang Våland et al., 2014) [30].

2.5. Digital Transformation and Project Management Efficiency

In light of the great waves of development that the world is witnessing, the control of information technology on most of the different sectors, which have become based on them in a very large part. Adapting with the current modern developments is very important in the field of project management in all its aspects (Crawford, L. & Nahmias, A.H. 2010), [29].

Complete project management without IT intervention does not help to complete the project on time and within budget without using the tools provided by IT. Information technology has a huge role in project management these days as information technology has made the project management process more efficient and productive and contributes to achieving more time and less time than ever before (Hermano et al., 2022) [21].

These modern technologies, especially those related to the management, organization and processing of various information, help in making the right decision, or rather, the closest to the right one; Rapid and successive changes require quick and decisive decisions at the same time, which would not be possible through traditional methods (Wu, T. 2021), [31].

When it comes to technology and project management, need to know enough about the subject to understand business needs. The business will have a certain set of equipment needs that may differ from the needs of other businesses or businesses. Therefore, the company must determine the objectives and strategies of the project, then choose the technological aspects related to it that help to achieve it (Crawford et al., 2010) [29].

Effective use of information technology to support corporate operations is an important part of project management in most companies (Raymond et al., 2020) [2]. Where there is an urgent need to have a special system in which information learned or used by individuals within the company is shared and used to achieve the strategic objectives of the project (Bhattacharya et al., 2012) [25].

2.6. Change Management and Project Management Efficiency

Project change management stands for a management approach to addressing changes that may occur during the project process and how stakeholders agree to those changes. Change management is an important part of enterprise success. The change management process defines the steps used to identify and make changes to the project, including its scope (Karlsen et al., 2020) [32].

While the integration of the disciplines of “project management” and “change management” is a must for

project success, they are often seen as separate and unequal components of successful business initiatives; The problem is that project management often gets the lion's share of stakeholder attention, while change management is often neglected and ignored. As mentioned above, this can cause many problems because change management accounts for 80% and is the one that contributes the most to the success of the initiative (Fraser-Arnott, M. (2018) [33].

“Project management ensures that a project is successfully designed, developed and delivered; Change management ensures that the project is adopted, implemented, and used by those who are targeted by the change or who benefit from it (Haberfellner et al., 2019) [34].

Successful change management using project-based intervention is critical for any organization to succeed in the highly competitive and evolving global business environment. While a number of change management theories are widely accepted, the literature indicates that they fall short in their endeavors due to the theories' lack of a useful framework for successfully planning, implementing, and managing change (Parker, et al., 2013) [35].

3. Research Methodology

3.1. Research Theoretical Model and Hypotheses

Based on the empirical literature, the model expressed digital transformation three basic dimensions that include (Employee Digital Skills (DS)- Digital Transformation

Strategy (DTS)-Digital Technology (DT)) based on previous studies mentioned in detail in the literature review such as Study (Teng et al, 2022) [36] and other empirical research papers attached in the literature review.

In context, the main concept of the ADKAR model is to investigate the role of each of change management which consists of main dimensions (Awareness-Desire-Knowledge- Ability- Reinforcement) according to Study (Kachian, et al, 2018) [37], and the Study (Bedser, 2012) [38].

Finally, regarding the change management groups (Company’s main features- Project management process-Project, Program and Portfolio Performance) according to Study (Rebolledo, 2020) [39].

It is clear that the conceptual model of Change Management as a Mediating Variable on the Relationship between Digital Transformation and Project Management Efficiency has been thoroughly discussed and studied. Thus, the conceptual, associational, and research models with hypothesis are presented in the figure below.

3.2. Hypotheses

H1: "There is impact of Digital Transformation on Change Management of Electricity sector in Egypt"

H2: "There is impact of Change Management on the Project Management Efficiency of Electricity sector in Egypt"

H3: "There is impact of Digital Transformation on the Project Management Efficiency of Electricity sector in Egypt"

H4: "There is impact of Digital Transformation on Project Management Efficiency through Change Management of Electricity sector in Egypt".

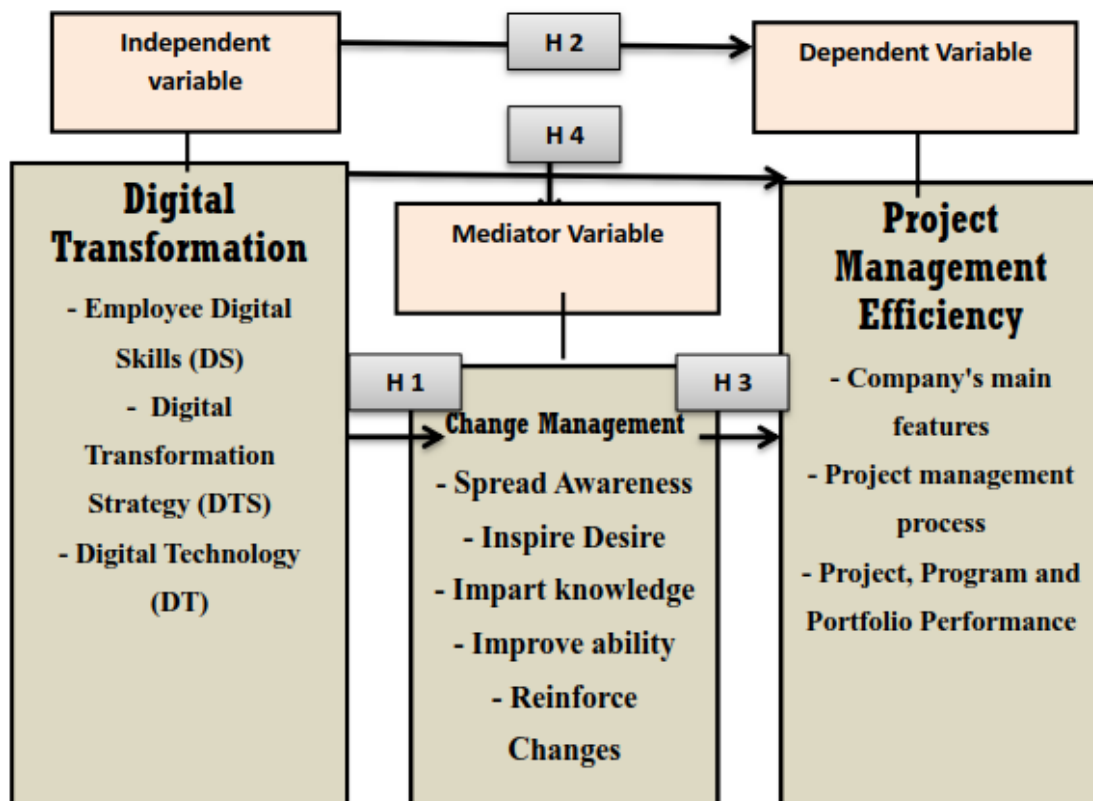


Figure 1. Conceptual framework of the study

3.3. Population

The study was carried out in Egypt and focused on Egypt's electricity private sector is currently facing a variety of conflicting and overlapping challenges. This is mainly seen in Egypt's grueling efforts to strike a balance between production, domestic consumption, and export revenue while seeking to maintain internal political harmony, Egypt's rapidly expanding population and high unemployment present significant growth challenges, necessitating a more developed and vibrant private sector. The private sector already plays an important role in the economy, employing the vast majority of people. There is a significant opportunity for private sector investment to meet the country's growing energy demand while also promoting a greener economy. There is also plenty of room for the private sector to address skill mismatch issues and improve training.

The Egyptian government represented by The Ministry of Electricity and Renewable Energy encourages the private sector to invest in the field of power generation and distribution either conventional or renewable energy by giving the private sector all licenses required in a short period in addition to incentives to allow them to cope with Egypt's Vision 2030 aims to achieve a diversified, competitive, and balanced economy within the framework of sustainable development.

The "ISES- Integrated Sustainable Energy Strategy 2035" ensures continuous, diverse energy security and creates the conditions for increased renewable development through the participation of all sectors. Furthermore, the strategy reaffirms Egypt's ambition to become an energy hub connecting Europe, Asia, and Africa by expanding, grid interconnections throughout the Arab region and beyond.

Egypt has a wealth of untapped solar and wind resources, and according to the ISES 2035, renewable energy capacity will account for 42% of total power capacity by 2035.

According to The Ministry of Electricity and Renewable Energy and Egyptian Electric Utility & Consumer Protection Regulatory Agency EGYPTERA there are 342 private companies have licenses to work in the field of manufacturing of electrical equipment, power generation and distribution, 230 electrical equipment manufacturing companies, and 112 power generation and distribution companies, the total employees of Egyptian electricity private sector are about 281500 employees.

In this study, we used a cross-sectional design and collected data from 416 employees working in different private electricity companies in Egypt. The use of this

design is based on previous literature in the field of Digital Transformation, Project Management Efficiency, and Change Management.

3.4. Sample Size

The study applied the Quota Technique, while the research Focuses on the Energy Private Sector in Egypt.

Type of Firms: 3 Electrical equipment manufacturing companies (Schneider Electric Egypt, ABB, and Schneider Electric Egypt), 3 Generation and electrical distribution companies (Karm Solar, TAQA, and Global) and Elsewedy electric working for both activities with a total of employees 23252. Table 1 shows the distribution of the study sample According to the company.

A sampling frame is a comprehensive list of all sampling units, from which a sample can be, selected. The study's sampling frame was made up of Employees and managers of Electricity sector in Egypt, and (416) employees respond and their questionnaires were obtained for statistical analysis.

3.5. Data Collection Procedure

The study collected primary data by administering a structured, closed-ended questionnaire. The survey questionnaires consist of three sections, each of which was employed to collect data from a sample of the Egyptian private electricity sector: The first section consists of three aspects of digital transformation. Employee Digital Skills (DS) - Digital Transformation Strategy (DTS) - Digital Technology (DT)) Adapted from the Developed Questionnaire (Teng et al, 2022) [36]. To measure change management in the second section, this study uses the ADKAR model is to investigate the role of each of change management which consists of main dimensions (Awareness- Desire- Knowledge- Ability- Reinforcement) according to Study (Kachian, et al, 2018) [37], and Study (Bedser, 2012) [38]. Finally, regarding the change management groups (Company's main features- Project management process- Project, Program and Portfolio Performance) according to Study (Rebolledo, 2020) [39].

The primary data collected using the questionnaire were processed by some statistical methods that are suitable for the study hypotheses, in order to summarize and describe the different correlation and effect between the study variables. The statistical software ready for data analysis known as SPSS& Stata was used.

Table 1. Distribution of the Sample on the According to the company

Company	Upper and middle management	Staff	Total Employee numbers	Sample	Respondents
Karm solar	16	117	133	3	4
Schneider Electric Egypt	293	1807	2100	35	66
ABB Egypt	176	1224	1400	23	44
Siemens Egypt	105	695	800	13	25
Elsewedy electric	1824	16178	18000	289	251
TAQA	64	436	500	9	16
Global	23	288	320	6	10
Total	2501	20752	23253	378	416

To ensure the questionnaire were complete and consistent before processing their responses, they were edited. Quantitative data collected was analyzed by the use of descriptive statistics and presented through percentages, means, standard deviations, and frequencies. To determine the relationship between the study’s dependent and independent variable further regression analysis was conducted.

4. Data Analysis and Results

4.1. Normality Distribution Test

Kolmogorov-Smirnov Test-(K-S): The K-S test is an empirical distribution function (EDF) in which the theoretical cumulative distribution function of the test distribution is contrasted with the EDF of the data. A limitation of the K-S test is its high sensitivity to extreme values; the Lilliefors correction renders this test less conservative. It has been reported that the K-S test has low power and it should not be seriously considered for testing normality. Moreover, it is not recommended when parameters are estimated from the data, regardless of sample size the null hypothesis is that “sample distribution is normal.” If the test is significant, the distribution is non-normal. For small sample sizes, normality tests have little power to reject the null hypothesis and therefore small samples most often pass normality tests. (Ghasemi, Asghar & Zahediasl, Saleh 2012) [40]. As shown in Table 2 that all dimensions are distributed naturally.

Table 2. Normality Distribution Test

Dimension	p-value
Change Management	0.712
Awareness	0.675
Desire	0.878
Knowledge	0.123
Ability	0.445
Reinforcement	0.786
Digital Transformation	0.678
Employee Digital Skills (DS)	0.443
Digital Transformation Strategy (DTS)	0.342
Digital Technology (DT)	0.677
Project Management Efficiency	0.352
Company’s main features	0.123
Project management process	0.276
Project, Program and Portfolio Performance	0.476
Total	0.337

4.2. Internal Consistency Reliability

The consistency of a measure is what is defined as reliability. This is measured using the test-retest measure. When many similar items are included in a test, or a diverse sample of individuals are measured or using testing procedures that are uniform then reliability is increased. The Cronbach alpha score of the instrument used to collect primary data was calculated. Cronbach alpha measures range between 0-1. When the Cronbach alpha Scores are between 0-0.6 it shows that the instrument reliability is low. When e scorers are 0.7 and higher then reliability and internal consistency are high (Cooper, & Schindler 2013) [41].

Table 3. Results of Validity and Reliability to Variable of Digital Transformation

Dimensions	Internal consistency	No.	alpha Cronbach
Employee Digital Skills (DS)	0.739	5	0.696
	0.483		
	0.483		
	0.841		
	0.855		
Digital Transformation Strategy (DTS)	0.669	5	0.831
	0.843		
	0.948		
	0.716		
	0.772		
Digital Technology (DT)	0.892	5	0.758
	0.880		
	0.617		
	0.174		
	0.816		

Table 4. Results of Validity and Reliability to Variable of Change Management

Dimensions	Internal consistency	No.	alpha Cronbach
Awareness	0.928	4	0.829
	0.693		
	0.856		
	0.808		
Desire	0.890	4	0.778
	0.785		
	0.885		
	0.605		
Knowledge	0.724	4	0.735
	0.735		
	0.451		
	0.862		
Ability	0.469	4	0.720
	0.876		
	0.537		
	0.772		
Reinforcement	0.824	4	0.755
	0.790		
	0.828		
	0.931		

Table 5. Results of Validity and Reliability to Variable of Project Management Efficiency

Dimensions	Internal consistency	No.	alpha Cronbach
Company’s main features	0.537	5	0.777
	0.455		
	0.278		
	0.396		
	0.113		
Project management process	0.571	5	0.752
	0.560		
	0.851		
	0.777		
	0.393		
Project, Program and Portfolio Performance	0.379	5	0.788
	0.393		
	0.740		
	0.832		
	0.677		

4.3. Overall Statistics for Digital Technology D.T.

The extent of interest in the D.T. has been determined in the Egyptian electricity sector, so these dimensions from the viewpoint of the study sample are arranged. The results were as follows:

Table 6. Descriptive Statistics for the D.T. Variable

N	Dimensions	Mean	Std.
1-	Employee Digital Skills (DS).	3.74	0.585
2-	Digital Transformation Strategy (DTS).	4.05	0.567
3-	Digital Technology (DT).	3.28	0.650
	Total (D.T.)	3.69	0.445

From the previous Table 6, we find that the most available dimensions of D.T. are respectively: The first (Digital Transformation Strategy (DTS)) the Mean is (4.05) and a rate of (80.92%). The second (Digital Transformation Strategy (DTS)) the Mean is (3.74) the rate is (74.77%). The third (Digital Technology (DT)) the Mean is (3.28) the rate is (65.54%). Therefore, there is a high availability of D.T. dimensions, and opinions tend to agree, with the overall average of the dimensions being (3.69), with an agreement rate (73.74%).

The extent of interest in the Ch. M. has been determined in the Egyptian Electricity sector, so that these dimensions from the viewpoint of the study sample are arranged. The results were as follows:

Table 7. Descriptive Statistics for the Ch.M. Variable

N	Dimensions	Mean	Std.
1-	Awareness	3.90	0.670
2-	Desire	4.10	0.434
3-	Knowledge	3.87	0.412
4-	Ability	4.21	0.323
5-	Reinforcement	3.44	0.652
	Total (Ch.M.)	3.90	0.311

From the previous Table 7, we find that the most available dimensions of Ch.M. are respectively: The first (Ability) the Mean is (4.21) and a rate of (84.23%), The

second (Desire) the Mean is (4.10) the rate is (81.92%), The third (Awareness) the Mean is (3.90) the rate is (78.08%), the fourth (Knowledge) the Mean is (3.87) the rate is (77.31%), the fourth (Reinforcement) the Mean is (3.44) the rate is (68.85%). Therefore, there is a high availability of Ch.M. dimensions, and opinions tend to agree, with the overall average of the dimensions being (3.90), with an agreement rate (78.08%).

The extent of interest in the Project Management Efficiency has been determined, so that these dimensions from the viewpoint of the study sample are arranged in Egyptian Electricity sector. The results were as follows:

Table 8. Descriptive Statistics for the Project Management Efficiency Variable

N	Dimensions	Mean	Std deviation
1-	Company's main features.	3.63	72.62%
2-	Project management process.	3.82	76.31%
3-	Project, Program and Portfolio Performance.	3.41	68.15%
		3.62	72.36%

From the previous Table 8, we find that the most available dimensions of Project Management Efficiency are respectively: The first (Project, Program and Portfolio Performance) the Mean is (3.82) the rate is (76.31%). The second (Company's main features) the Mean is (3.63) and a rate of (72.62%). The third (Project management process) the Mean is (3.41) the rate is (68.15%), Therefore, there is a great availability of the dimensions of Project Management Efficiency, and opinions tend to agree, as the overall average for the dimensions is (3.62), with an agreement rate (72.36%).

4.4. Confirmatory Factor Analysis

To examine the construct validity, a set of confirmatory factor analyses (CFAs) were performed in STATA14. First, we conducted a baseline model (model 5, 3-factor) that was composed of all main variables—, Employee Digital Skills (DS) - Digital Transformation Strategy (DTS)- Digital Technology (DT), Project Management Efficiency and Change Management (Ch.M)—to calculate the model fit indices (shown in Table 9 and compare with other models.

Table 9. Results of confirmatory factor analysis

Measurement Model	CMIN/DF <5	IFI>0.90	CFI>0.95	TLI>0.90	RMSEA 0.05<Rms<0.088	RMR<0.05
Model 1	1.96	0.99	1	1	0.0682	0.000
Model 2	1.77	0.99	1	1	0.0691	0.000
Model 3	1.85	0.97	1	1	0.0759	0.000
Model 4	2.02	0.96	1	1	0.0815	0.000
Model 5	2.13	0.95	1	1	0.0836	0.000

CMIN/DF, chi-square/degree of freedom; IFI, incremental fit index; CFI, comparative fit index; TLI, Tucker-Lewis index; RMSEA, root mean square error of approximation

The findings show a good model fit for the baseline model compared to other proposed models in the study:

Model 1, chi-square/degree of freedom (CMIN/DF) = 1.96, incremental fit index (IFI) = 0.99, comparative fit index (CFI) = 1, Tucker–Lewis index (TLI) = 1.00, root mean square error of approximation (RMSEA) = 0.0682, All indices conformed to the set criteria, indicating that the model developed from concepts and theory fitted well, And so for the rest of the models.

CFA with maximum likelihood estimation was conducted for all 5 models. The factor loading for each factor was found to be significant, indicating good convergent validity. The average variance extracted (AVE) of all proposed variables was checked and the square root of every AVE was found to be greater than all the coefficients of the variables.

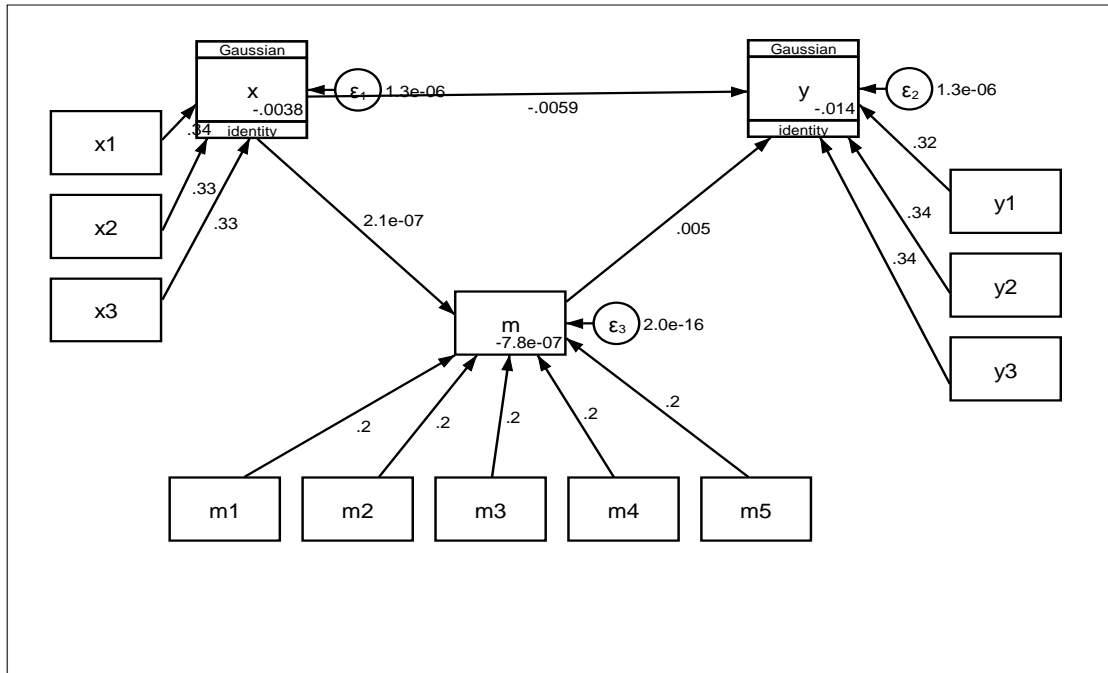


Figure 2. Adjusted structural equation according to program suggestions and analysis of 6000 rounds of bootstrapping

There is a statistically significant impact of Digital Transformation on Project Management Efficiency through Change Management among Energy operators in Egypt.

The main research question was whether the perception model of Digital Transformation and Project Management Efficiency, with Change Management as mediator, was congruent with the empirical evidence. Analysis results indicated that the model developed from concepts and theory was congruent with the empirical evidence, since all fit indices satisfied the criteria. In other words, the model developed on the basis of concepts and theories concerning Digital Transformation explained Project Management Efficiency with the effective mediator of Change Management.

Mediator variables were tested by the resembling method with the replacement of 6000sets. In this study, there were 416 sample units, so sampling with replacement might obtain repetitive units and these were not regarded as a mistake. Each set of data was used for the regression analysis to identify dependent, independent, and mediator variables. Analysis results obtained the path coefficient along the path to and from the mediators, and the standard error (SE) of each of the 6000 sets, as shown in Table 10.

Table 10. The fourth hypothesis

Parameter	Estimate	Se	Z	95% CL		p- value
				Lower	Upper	
P.M←D.T.	0.322	0.020	5.86	0.128	0.257	0.000**
Company’s main features←D.T.	0.165	0.030	5.45	0.106	0.224	0.000**
Project management process←D.T.	0.420	0.029	14.34	0.326	0.477	0.000**
Project, Program, and Portfolio Performance←D.T.	0.385	0.041	9.35	0.305	0.466	0.000**

** Statistical significance at the level (0.01).

* Statistical significance at the level (0.05).

5. Discussion

The purpose of this section is to discuss the results in the context of the present research, the study aims to empirically find out the impact of Digital Transformation on Project Management Efficiency through the Change Management of the Electricity sector in Egypt. The study reached several results that could contribute to solving the study problem, answering its questions, and testing its hypotheses. The researcher has classified the results of the field study according to the variables he has identified in

the study of the effect of Change Management as an intermediate variable in the relationship between Digital Transformation as an independent variable, Project Management Efficiency as a dependent variable, so that the benefit is more clear.

The study concluded that the interest in Change Management was high in the Electricity sector in Egypt and that opinions tend to agree with regard to the expressions of this variable. It was found that the most available dimensions of Change Management are respectively: The first (Ability), The second (Desire), The

third (Awareness), the fourth (Knowledge), and the fourth (Reinforcement).

As for the extent to which the results of the current study are consistent with the results of previous studies regarding the Change Management variable, the following was found: A study (Zubac et al., 2021) [28] provided insights into the activities, structural and organizational learning, and cognitive mechanisms that are intentionally encouraged or created in organizations to allow their employees to successfully implement strategy and effect change, illustrating the benefits associated with creating procedures designed to overcome cognitive deficiencies in decision-makers. While implementing or making adjustments to the strategy in a timely manner. The study (Haffar et al., 2019) [12], showed that there are two elements of individual readiness for change: (personal benefit and self-efficacy) that are the most supportive of the application of total quality management. The study (Oboreh, et al, 2019) [4] concluded that technological changes have a significant positive impact on organizational performance, change management strategies have a significant positive impact on organizational performance, and leadership changes have a significant positive impact on organizational performance in industrial companies. A study (Iljins et al., 2015) [14] confirmed that during the period of change, organizational culture affects the organizational climate through specific factors. A theoretical model is presented for how changing the organizational culture affects the evolution of the organizational climate.

The current study concluded that there is a high degree of interest in Digital Transformation in the Electricity sector in Egypt, from the point of view of the study sample, those opinions indicate agreement towards the dimensions of this variable. It was found that the most available dimensions of Digital Transformation are respectively: The first (Digital Transformation Strategy (DTS)), The second (Digital Transformation Strategy (DTS)), and The third (Digital Technology (DT)).

As for the extent to which the results of the current study are consistent with the results of previous studies regarding the Digital Transformation variable, the following has been found: The study (Vendraminelli et al., 2022) [18] reached a three-stage model (understanding the reality, defining the digital transformation strategy, and converting the digital transformation strategy into digital projects), and the framework provides a structure for managing digital transformation through strategy development and implementation. The study (Li et al., 2021) [42] found different results of the mediating effect and the effect of the direct relationship. The process of knowing socialization directly affects the anticipatory ability of IT/information technology systems and the digital business transformation of enterprises. The study (Salib, Mariam, 2020) [9] clarified the measures of progress and obstacles to implementing a digital business strategy.

The current study concluded that there is a high degree of interest in Project Management Efficiency in the Electricity sector in Egypt, from the point of view of the study sample, those opinions indicate agreement towards the dimensions of this variable. It was found that the most available dimensions of Project Management Efficiency

are respectively: The first (Project, Program, and Portfolio Performance), The second (Company's main features, and The third (Project management process).

As for the extent to which the results of the current study are consistent with the results of previous studies regarding the Project Management Efficiency variable, the following has been found: The study (Hermano et al., 2022) [21] found that the dynamic capabilities do not directly affect the company's performance, but it does indirectly by increasing the companies' performance in projects, programs, and portfolios. Both project and portfolio performance have a mediating effect on the relationship between dynamic capabilities and company performance. But portfolio performance absorbs all of that impact when both performances are in the form. The study (Bushuyev, S. & Friedrich Wagner, R. 2014) [19] showed that IPMA Delta is a comprehensive assessment of organizational competence in project management. Three modules were used to assess the competence of selected individuals, the application of project management to selected projects, and the organization's approach to project management. Through evaluation, the organization obtains insights regarding the current maturity and delta to the required target state. The study (Karlsen et al., 2020) [32], found that the project manager mostly emphasized the externally directed entrepreneur role, and less emphasized the internally directed resource allocation role focused on project management.

The study also found that there is a positive effect statistically significant at the level of significance (0.01) of Digital Transformation on Change Management. However, the study (Bhattacharya, et al., 2012) [25] collected three diverse strategic ideas, named pillars, to facilitate sustainable digital transformation. Within the third pillar, the three most important forces of continuity that provide resistance to change are the organization's culture, existing delivery processes and networks, and existing standard operating procedures. On the other hand, the main drivers of change are competitiveness needs. Global industry trends and the emergence of new technologies/innovations.

The study also found that there is a positive effect statistically significant at the level of significance (0.01) of Change Management on Project Management Efficiency. In the same vein, The study (Vuorinen, L. & Martinsuo, M.M. 2019) [3] identified both changes and deviations to the plan throughout the project life cycle. Various internal and external sources of change have been identified, and the study shows the interrelationship of changes on the potential escalation of changes throughout the project life cycle. Managers and project staff participate in various change management activities and improvise to create alternative paths, re-plan, catch up, and improve project performance after changes. A study (Parker et al., 2013) [35] found that a number of project management processes and techniques were detailed that demonstrate the applicability of project-based processes to implementing change management initiatives. It was assumed that the technical background of traditional project managers has led to an emphasis on tasks and results rather than the softer human aspects and skills of project management, which are of equal value to project success. Filling these two gaps can increase the success of

change management initiatives and similarly enhance the success of project-based interventions. The study (Verlinden et al., 2013) [43] identified the interrelated aspects of project management, change management, and performance management, and that improved organizational performance and increased productivity can be achieved by adopting an integrative approach to project-based interventions. The study critically discussed the value of project-based management in the change management process, with a special focus on change interventions to achieve better project organizational performance.

The study also found that there is a positive effect statistically significant at the level of significance (0.01) of Digital Transformation on Project Management Efficiency.

6. Conclusion

When examining the mediation of Change Management, the relationship between employee perceptions of Digital Transformation and the Company's main features as one of the dimensions of Project Management Efficiency, the following was found: The perception variables of Employee Digital Skills (DS) on the process had statistically no significant influence on Company's main features.

Change Management (Ch.M) positively mediates the association between employees' perceptions of Employee Digital Skills (DS) and the Company's main features.

Digital Transformation Strategy (DTS) had a statistically significant direct influence on Company's main features. Meanwhile, results showed that the perception variable of Digital Transformation Strategy (DTS) on process influenced Company's main features through (Ch.M).

Change Management (Ch.M) positively mediates the association between employees' perceptions of Digital Transformation Strategy (DTS) and the Company's main features.

Digital Technology (DT): had a statistically significant direct influence on Company's main features. Meanwhile, results showed that the perception variable of Digital Technology (DT) on process influenced Company's main features through (Ch.M).

Change Management (Ch.M) negatively mediates the association between employees' perceptions of Digital Technology (DT) and the Company's main features.

When examining the mediation of Change Management, the relationship between employee perceptions of Digital Transformation and the Project management process as one of the dimensions of Project Management Efficiency, the following was found:

Employee Digital Skills (DS) had a statistically significant direct influence on the Project management process, Change Management (Ch.M) mediates the association between employees' perceptions of Employee Digital Skills (DS) and the Project management process.

Digital Transformation Strategy (DTS) had a statistically significant direct influence on the Project management process. Meanwhile, results showed that the perception variable of Digital Transformation Strategy

(DTS) on process influenced the Project management process through (Ch.M).

Change Management (Ch.M) positively mediates the association between employees' perceptions of Digital Transformation Strategy (DTS) and the Project management process.

Digital Technology (DT): had a statistically significant direct influence on the Project management process. Meanwhile, results showed that the perception variable of Digital Technology (DT) on process influenced the Project management process through (Ch.M).

Change Management (Ch.M.) positively mediates the association between employees' perceptions of Digital Technology (DT) and the Project management process.

When examining the mediation of Change Management, the relationship between employee perceptions of Digital Transformation and Project, Program, and Portfolio as one of the dimensions of Project Management Efficiency, the following was found:

Employee Digital Skills (DS) had a statistically significant direct influence on Project, Program and Portfolio Performance. Change Management (Ch.M) mediates the association between employees' perceptions of Employee Digital Skills (DS) and Project, Program, and Portfolio Performance.

Digital Transformation Strategy (DTS) had a statistically significant direct influence on Project, Program, and Portfolio Performance. Meanwhile, results showed that the perception variable of Digital Transformation Strategy (DTS) on process influenced Project, Program, and Portfolio Performance through (Ch.M).

Change Management(Ch.M.) positively mediates the association between employees' perceptions of Digital Transformation Strategy (DTS) and Project, Program, and Portfolio Performance.

Digital Technology (DT): had a statistically significant direct influence on Project, Program, and Portfolio Performance. Meanwhile, results showed that the perception variable of Digital Technology (DT) on process influenced Project, Program, and Portfolio Performance through (Ch.M).

Change Management (Ch.M) negatively mediates the association between employees' perceptions of Digital Technology (DT) and Project, Program, and Portfolio Performance.

7. Practical Implications

From the results of the study, it is clear that there is a high degree of interest in Digital Transformation in the Electricity sector in Egypt. Accordingly, the following recommendations related to supporting and strengthening strengths can be presented as follows:

- Companies provide employees with resources or opportunities to acquire digital skills appropriate for digital transformation.
- Working to balance general digital skills with specialized digital roles is sufficient.
- Work on preparing and developing talented employees who understand both business and digitalization.

- Companies are interested in providing employees with resources or opportunities to acquire digital skills appropriate for digital transformation.
- Ensure that the companies' digital transformation strategy contributes to improving innovation capabilities.
- Ensure that the company's digital transformation strategy contributes to a fundamental change in business operations.
- Companies use artificial intelligence technology in digital transformation.
- Companies use social media (collaboration technology).
- Ensuring that companies use big data and data analytics.

From the results of the study, it is clear that there is a high degree of interest in Change Management in the Electricity sector in Egypt. Accordingly, the following recommendations related to supporting and strengthening strengths can be presented as follows:

- Ensure that workers are aware of the objectives of change in companies.
- Keenness to know the effectiveness of change in companies.
- Work to understand the causes of change in companies.
- That all workers have ample opportunities in the process of change.
- Instill enthusiasm in employees so that they can be part of the change through their active participation.
- Work to ensure that all workers benefit from the change towards digital transformation.
- Ensure that employees have clarity about change.
- Ensure that employees have the necessary knowledge to deal with change.
- Work on employees' understanding of how their work relates to change.
- Supporting the ability of workers to perform better due to the changes that have taken place.
- Develop the ability of employees to contribute positively to change.
- Support the ability of employees to perform at the level required by the changes.
- Ensure that all employee doubts are addressed to reduce resistance to change.

From the results of the study, it is clear that there is a high degree of interest in Project Management Efficiency in the Electricity sector in Egypt. Accordingly, the following recommendations related to strengthening strengths and treating weaknesses can be made as follows:

- Ensure that communication flows mainly between similar hierarchical levels.
- Take care that the production process is organized using temporary teams.
- Ensure that project managers within the company hold senior management positions and have direct control over business functions, personnel, and other resources.
- Ensure that the company's outputs reflect the application of new knowledge.
- Improvements in the production process are implemented through projects.
- Ensure that all projects use the project management information system.

- The project plan and documentation are updated frequently as the project progresses.
- Ensure that good organizational culture, structure, and processes strongly influence the project management plan.
- Project management processes are adapted to specific project features and measured in terms of quality.
- Ensure that projects meet their schedule targets.
- Ensuring that programs achieve cost-benefit objectives.
- Ensure that program implementation reflects business strategy.
- Ensure that projects achieve operational performance targets.

8. Limitations and Recommendations for Future Researches

The current study has been defined in some respects, so it is suggested that work be done to complete the scientific application in this field with future studies for applicants for graduate studies programs in Egyptian universities, here are some suggested topics related to the current study topics:

- The application of this study is limited to the Electricity sector in Egypt, so it is suggested to apply also to other sectors and fields such as banks, hospitals, and hotels.
- The study focused on the topic of Digital Transformation (as an independent variable). Therefore, it is suggested to study the factors affecting Digital Transformation. The issue of Project Management Efficiency (as a dependent variable) has been addressed, so it is suggested to study other factors that may be affected by Project Management Efficiency.
- Some Digital Transformation dimensions have been addressed, so it is suggested to study other dimensions that represent Digital Transformation, such as (administrative Digital Transformation - technological Digital Transformation - Digital Transformation in service...). Some dimensions of organizational Sportsmanship have also been covered, so it is suggested to study other dimensions of Project Management Efficiency.
- Studying other recent topics related to and influencing Digital Transformation, such as:
- Study the impact of Digital Transformation on achieving the competitive advantage of companies.
- Study the effect of making use of Digital Transformation in achieving entrepreneurship.
- Studying other recent topics related to relationships and influence on Project Management Efficiency, such as:
- Adopting some other international models in studying the topic of Project Management Efficiency.
- Study the impact of strategic intelligence on organizational resilience through its application in the Electricity sector in Egypt.

- Study the impact of strategic leadership on Project Management Efficiency, by applying it to the Electricity sector in Egypt.

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