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The Impact of Digital Transformation on Raising the Efficiency of Industrial Processes "UTEC Case Study for Electrical Transformers"

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Abstract: ***The study aimed to analyze the level of digital transformation implementation at UTEC (United Transformers Electric Company), identify the key digital technologies used in its industrial processes, and evaluate the impact of digital transformation on the efficiency of industrial operations in terms of productivity, quality, and operational cost reduction. It also sought to examine the challenges and difficulties the company faces during the implementation of digital transformation initiatives and their effect on industrial performance. The study adopted a descriptive-analytical approach, relying on literature, references, and logical inference as the main tools for data and information collection. The study concluded that implementing digital systems such as ERP and digital design software improved workflow, reduced process time, and significantly increased productivity. Digital testing tools and automated quality monitoring contributed to lowering defect rates and documenting processes more accurately, enhancing product compliance with technical standards. Predictive maintenance, improved inventory management, and reduced waste of raw materials and time led to a noticeable decrease in overall production costs. Data systems and analytical control panels provided real-time and precise insights into performance indicators, enabling management to make data-driven decisions and improving operational planning and management.***

Keywords: Digital Transformation, Industrial Efficiency, Enterprise Resource Planning, Quality Control, Production Cost Reduction

1. Introduction

In recent years, the world has witnessed rapid development in the fields of technology and digital transformation, as the adoption of modern technologies has become a strategic necessity for industrial companies wishing to enhance their competitiveness and improve the efficiency of their operations. Digital transformation is no longer just a technological option, but has become a key pillar to achieve sustainability and high productivity in a rapidly changing and increasingly challenging business environment. (Al-Juhani, 2025, p. 14)

In this context, industrial processes are one of the areas most affected by digital transformation, as the applications of the Fourth Industrial Revolution such as the Industrial Internet of Things (IIoT), intelligent data analytics, automation, and artificial intelligence contribute to raising production efficiency, reducing waste, and improving the quality of products. Hence, the need to study the actual impact of these transformations on the performance of industrial companies in the Kingdom of Saudi Arabia, especially those working in the electrical equipment manufacturing sector, has emerged as this sector plays a vital role in supporting infrastructure projects and the national industrial transformation. (Fathy, 2020, p. 403)

This study focuses on UTEC as an applied model for digital transformation in the Saudi industry, and aims to analyze the impact of the application of digital transformation technologies on raising the efficiency of industrial processes within the company, by evaluating the indicators of production performance, quality, cost, and speed of response, as well as reviewing the challenges faced by the transformation process and the solutions adopted to overcome them.

2. Study Problem

Many industrial enterprises are facing increasing challenges in light of the rapid technological transformations that the world is witnessing, as digital transformation has become a strategic necessity to ensure continued competition and achieve the required operational efficiency. Although companies are aware of the importance of this transformation, the level of adoption and effective adoption of this transformation varies from one facility to another, making it necessary to study the impact of this transformation realistically and in the field.

UTEC has begun to embrace digital transformation initiatives to develop its industrial processes and improve operational efficiency, but the extent to which these initiatives will impact the company's actual performance indicators, such as productivity, quality, waste reduction, and responsiveness, remains unclear.

Hence, **the problem of the study** stems from the following main question:

What is the impact of digital transformation on raising the efficiency of industrial processes at UTEC Electrical Transformers?

3. Importance of the Study

First: Scientific Importance

1) **Enriching academic knowledge** in the field of digital transformation and its applications in raising the efficiency of industrial processes, especially in the electrical industry sector.
2) **To provide a theoretical and analytical framework** that links the concepts of digital transformation with

industrial performance indicators such as productivity, quality, and cost.
3) **Supporting future studies** in the field of the Fourth Industrial Revolution by providing an applied model for a case study in a Saudi industrial environment.

Second: Practical Importance
1) Assist the company under study (UTEC Electrical Transformers) to assess the impact of digital transformation on its industrial operations and identify possible areas for improvement.
2) Provide practical recommendations that can contribute to raising operational efficiency, reducing costs, and improving product quality.
3) Supporting decision-makers in the industrial sector to adopt digital transformation as a strategic tool to achieve sustainable competitiveness in line with the goals of the Kingdom's Vision 2030.

Objectives of the study
1) Analyze the level of digital transformation application in UTEC Electrical Transformers, and identify the most important digital technologies used in its industrial processes.
2) Assess the impact of digital transformation on the efficiency of industrial processes in terms of productivity, quality, and reduction of operational costs.
3) Identify the challenges and difficulties facing the company during the implementation of digital transformation initiatives and their impact on industrial performance.

Study Questions
1) What is the level of digital transformation implementation at UTEC Electrical Transformers? What are the most prominent digital technologies used in its industrial processes?
2) What is the impact of digital transformation on the efficiency of the company's industrial processes in terms of productivity, quality, and reduction of operational costs?
3) What are the most prominent challenges and difficulties facing the company during the implementation of digital transformation initiatives? How do these challenges affect the level of industrial performance?

4. Study Methodology

The descriptive-inductive method.

Study Tool: Literature, references, and inference, as the main tool for collecting data and information, in accordance with the nature of the descriptive inductive method, which is based on analyzing reality and deducing results through reviewing and analyzing the available scientific content.

5. Limitations of the study:

Objective Limits: The Impact of Digital Transformation on Raising the Efficiency of Industrial Processes "UTEC Case Study for Electrical Transformers".
Temporal Limits: 1447 AH – 2025 AD
Human Limits: Included employees, employees, and administrators working for UTEC Electrical Transformers.

Study Terms:

Digital Transformation: It is an investment in thought and behavior change, which aims to bring about a radical change in the way of work, using the technological development that has taken place to serve the beneficiaries better and faster. (Ashraf Mokhtar, 2020, p. 183)

Digital transformation (procedural): It is "the application of digital technologies to redesign processes, improve efficiency, and facilitate service delivery."

Industrial Processes: It is the set of organized activities and procedures through which raw materials are converted into intermediate or finished products using various tools, techniques, and production methods. (Ibrahim, 2020)

Industrial Processes (Procedurally): "The set of specific and measurable steps taken by the enterprise to convert inputs from raw materials, information and human resources into outputs represented in industrial products or services, according to standard procedures aimed at achieving efficiency and raising quality."

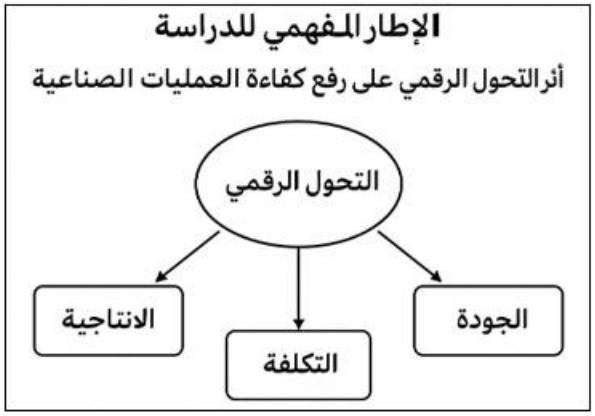


Figure 1: Illustrates the conceptual framework of the study

6. Previous Studies

1) Asma and Manal Al-Ghamdi's (2024) study aimed to identify the role of digital transformation in the implementation of projects in the private sector in the Kingdom of Saudi Arabia by improving the efficiency and effectiveness of implementation processes and project management through the use of modern technologies and digital technology, and also aims to improve competitiveness and promote innovation in the private sector. The study also points to challenges related to digital transformation such as the necessary investment in technology and the impact of changes on traditional ways of working, and digital transformation also requires the development of employee skills and providing the necessary support to achieve change overall, with the importance of investing in technology and developing effective digital strategies to drive innovation and promote sustainable growth.
2) Khawla Morsi's (2025) study aimed to highlight the role of digital transformation in improving banking services by focusing on its dimensions represented in providing

the requirements for the application of digital transformation, digitizing banking services, digitizing the customer experience, and analyzing its relationship to improving the quality of banking services and the quality of customer experience. To achieve these objectives, the researcher used a descriptive-analytical and statistical approach, where a questionnaire was relied on to target a sample of customers of banks operating in Algeria who own digital bank accounts and use their services. The sample size reached 190 customers who were randomly selected from several banks, including: the National Bank of Algeria, the Algerian Crédit Populaire, the Local Development Bank, the Algerian Baraka Bank, the Algerian External Bank, the Bank of Agriculture and Rural Development, and the Algerian Gulf Bank, distributed across the provinces of Algiers, Blida and Tipaza. The results found that there is a strong direct relationship between the implementation of digital transformation and the improvement of banking services, where the correlation coefficient reached 0.88, and it was also found that all dimensions of digital transformation positively affect the quality of banking services and the quality of the customer experience, which confirms that digital transformation contributes effectively to raising the level of customer satisfaction and enhancing the overall banking performance

3) Al-Juhani's study (2025) aimed to analyze the impact of the implementation of digital transformation on improving the quality of professional performance in Saudi companies listed on the stock exchange, by identifying the roles of digital transformation tools and the obstacles to their activation. The study relied on the descriptive-analytical method, where a questionnaire was distributed to a sample of employees in these companies. The results showed that there is a statistically significant positive impact of digital transformation on improving the quality of performance, and revealed a significant level of digital adoption, in addition to challenges such as lack of competencies and infrastructure, which necessitates the adoption of clear strategies and training of employees to maximize the benefit.
4) The study of Safinaz (2025) aimed to investigate the impact of digital transformation on financial fragility in the Egyptian food industry sector, by measuring the impact of this transformation on several financial indicators, namely: the rate of financial diversification, the rate of financial liquidity, the ratio of indebtedness, and the rate of profitability. The researcher relied on the quantitative analytical method, and the panel regression models were applied using SPSS and EViews 13 software to analyze the financial data of the 9 out of 31 companies listed on the EGX within the food industry sector, during the two periods (2013-2017) as the pre-digital transformation period, and (2018-2022) as the post-digital transformation period. The most important results showed that there is a statistically significant positive impact of digital transformation on financial fragility, as it led to a significant improvement in all the studied financial indicators, as the rates of financial diversification, profitability, and liquidity increased, while the indebtedness ratio decreased significantly after the implementation of digital transformation, indicating its effective role in enhancing financial health and reducing fragility in the companies under study.
5) The study of Ziadi et al. (2024) aimed to identify the impact of digital transformation on improving job performance within companies, by analyzing the expected benefits of the application of digital transformation and the role of modern management methods in raising the efficiency of employees and improving the quality of their performance, and the study relied on the descriptive-analytical approach supported by statistical methods, where the researcher used the T-test for single samples, in addition to the General Linear Regression Model (GLM) One Way ANOVA was conducted to examine the impact of demographic and digital variables on job performance, and the study sample consisted of 129 employees and supervisors working in the corporate sector. The study concluded that digital transformation has a significant and positive effect on improving the performance of employees within companies, and that there is a clear statistical significance that indicates that raising the level of digital transformation increases the effectiveness of job performance, as the results showed that there are statistically significant differences in favor of the application of digital transformation according to T-tests and GLM models, and it also showed that demographic variables such as experience and job may contribute to varying degrees in explaining this effect, but the impact of digital transformation remained the strongest and most important in explaining overall job performance

7. Commenting on Previous Studies

Agreements:
The current study shares with previous studies the positive impact of digital transformation on improving performance and efficiency. All studies have shown that the application of modern digital technologies, such as artificial intelligence, big analytics, and cloud computing, contributes to increasing the efficiency of operations, whether they are industrial operations, banking, employee job performance, or the quality of customer experience. The studies also agreed that digital transformation requires the development of employee skills and appropriate investments in technology, with the need to adopt effective digital strategies to maximize benefits and promote innovation and sustainable growth, which intersects with the objectives of the current study in enhancing the efficiency of the industrial operations of the technical manufacturing company for electrical distribution panels.

Differences:
The current study differs from previous studies in the field of application, as it focuses on the industrial sector and production processes of a specific company, while previous studies focused on diverse sectors such as banking and banking, listed companies, and the food industry. The type of impactful results also varies, as the current study is concerned with measuring the impact of digital transformation on the efficiency of industrial processes directly, while previous studies focused on job performance, quality of services, customer experience, or financial indicators. The methodologies also differ, as previous studies relied on

questionnaires and statistical analysis using SPSS, regression models, and T-and GLM tests, while the current study is based on a case study and analysis of operational and productivity indicators, with the main beneficiaries differing between companies, customers, and employees.

8. Theoretical Framework

Digital Transformation

Digital transformation is "the process by which companies use information technology to improve their business processes, improve customer satisfaction and increase operational performance, and the most prominent benefits that organizations have reaped from digital transformation is building core capabilities that support the entire organizational structure, and formulating new values for the business world" (Chang et al. 2021:243).

Digital transformation can also improve and enhance physical products and services, by digitizing corporate products, sales channels, and customer communication channels using digital means, and motivating organizations to change their strategies, by channeling data and getting value through new businesses. In other words, digital transformation is the comprehensive use of technological tools and means to enhance the performance of companies and organizations, strengthen customer service, and streamline processes to achieve the goals set by organizations (Chang et al., 2021:243).

Digital transformation can be defined as the total results of many digital innovations that have led to the emergence of new structures, practices, directions, values, and beliefs that change, or replace existing rules within organizations, industrial, commercial, and other organizations. Researchers in the field of digital transformation agree - although there is no single accepted definition of it - that all organizations and organizations aspire to create new models for diverse businesses, improve their processes, and provide unique services to their customers, as the increasing capabilities of digital technologies to generate and extract information from data have made digital transformation inevitable, which requires diverse skills to analyze and translate that data into information that improves decision-making, and develop new business models in all sectors (Rof et all, 2020).

Digital transformation is a radical transformation and a paradigm shift, which will change traditional business activities through significant changes in thinking, culture, and behavior, and influencing individuals and organizations. It also uses new digital technologies – such as mobile devices, artificial intelligence applications, computing, blockchain technology, and the internet – to enable key business development with the aim of improving customer experience, streamlining processes, or creating new business models (Al-Alwan, 2023, p. 297).

Organizations and organizations go through two processes during the implementation of digital transformation, the first is the digitization process, i.e., the transformation of all the paper data within the organization into a digital format, the second process is to develop the level of digitization of organizations by integrating digital information technology, then to improve the operational performance of organizations, increase customer service, change the original business model by leveraging digital technologies, and provide opportunities to bring in new revenues and values (Chang et al., 2021:244).

Digital transformation can be procedurally defined as the process through which technical and digital means are used in order to convert paper data and information into digital data and information, and to benefit from modern technical applications and applications of artificial intelligence and computers in improving the skills, abilities and knowledge of workers in various institutions, bodies, companies and organizations in order to achieve the goals of these institutions and develop their performance.

Benefits of Digital Transformation:

Digital transformation in the industrial sector has been a strategic shift that reshapes manufacturing and management processes, as it enables factories to achieve unprecedented levels of efficiency and productivity, through the adoption of technologies such as the Internet of Things (IoT), artificial intelligence, and big data, where industrial companies can monitor the performance of machines in real-time, and predict breakdowns before they occur, reducing downtime and increasing the life of machines. Digital transformation also improves the quality of products through accurate automated control systems, and achieves flexibility in production lines that allow customization according to the customer's request. In addition, there are many benefits, including: (Hammad, 2020, p. 35)

1) Updating business models to keep pace with technological developments.
2) Improve operational efficiency, organization, and quality, simplify procedures for obtaining services provided to the public, and reduce the rate of errors.
3) Digital transformation will help organizations improve their industrial trajectory and use their materials more efficiently and optimally.
4) Digital transformation will open up greater opportunities after the opening of the dialogue between the public and private sectors and the partnership between them in cooperation with all ministries.
5) Digital transformation allows potential customers to learn about the business you are doing and make sales and purchases anytime, anywhere.
6) Facilitate how administrators monitor workflows.
7) Boosting investment revenues.
8) Enhance employee and customer satisfaction alike.
9) Creating opportunities to provide innovative and creative services away from traditional methods of providing services, to create a state of satisfaction and acceptance among the public towards the services of the institution or company such as mobile applications.
10) The speed of performing digital procedures is faster than those with traditional methods, so these procedures will be easy and fast for the beneficiaries.
11) When you fully digitize your business and work on transforming it in a good and perfect way, it will contribute to improving and raising the level of the overall profits of your business.

Reasons for the spread of digital transformation:

In recent decades, the world has witnessed a significant acceleration in the pace of digital transformation, driven by the spread of both mobile and the web, which have effectively contributed to a profound transformation in the methods of communication, consumption, and business organization, as these developments have led to the emergence of new models of services and products, and the promotion of process automation, which has been reflected on various actors in the economic and social fields (Ferhane, 2017).

Digital transformation is an urgent necessity sought by organizations because of the wide range of benefits it provides, including reducing operational costs, reducing effort in completing business, in addition to its role in improving operational efficiency and organizing it more effectively. Digital transformation also contributes to raising the level of employee performance by simplifying work processes and facilitating the delivery of services to the public. It also provides opportunities to create innovative solutions and services that enhance customer satisfaction and increase their acceptance of the services provided. On the other hand, digital transformation contributes to enhancing the interconnectedness between companies, institutions, and the private sector, ensuring data quality and achieving a reliable source of information. In addition, national transformation provides support to decision-makers by enabling them to monitor performance, improve the quality of services, and accurately and effectively define goals and strategies. (Ziadi et al., 2024, p. 527)

Characteristics of Digital Transformation

Digital transformation in the management of the company helps to achieve many characteristics that distinguish it from other traditional companies with a number of the following characteristics: (Mutraf, 2020, p. 145)

1) Digital management is working to establish modern training rules in the field of digital training.
2) Digital management has the ability to adapt to technological events regionally and internationally.
3) The organization's functionality in light of the digital transformation is characterized by rapid performance and improved communication environment.
4) Digital transformation services provide employees with the ability to perform managerially, equip them with skills and experience
5) The regional management enables the emergence of excellence, creativity and innovation for employees in all digital transformation programs available in the latest global means of modern technology.
6) Management through digital transformation can create a competitive environment in which it can keep pace with the developments of the digital world with strength and confidence.
7) Digital transformation technologies enable the management to transform from an administrative organization to a network organization characterized by providing employees with high skills, diverse experiences, and speed in completing transactions that enable its employees to continuously develop.



UTEC Company: United Transformers Company.

UTEC, a subsidiary of the Bawan Group, was established in 2001 as a joint venture between Bawan and Wilson Transformers, the leading power transformer and distribution manufacturer in Australia since 1933, and since then, UTEC has become a leader in power solutions with more than 120,000 square meters of manufacturing footprint across several plants producing medium-power oil transformers, dry-type distribution transformers, and power plants Standardized, packaged, prefabricated, mobile, medium voltage switches, low voltage switches, all types of panels and prefabricated data center, the quality solutions provided by UTEC serve all sectors of the Saudi market, such as utilities and mega construction, infrastructure, oil and gas, water, industry, transportation, data center, and urban developments, and UTEC products and solutions are also available on the network in more than 20 countries around the world, in addition to the products, it offers a service arm UTEC provides its customers with a wide range of services including testing, commissioning, installation, preventive maintenance, engineering, design, modifications, upgrade, modernization, partial discharge monitoring, thermal monitoring, and control. (Official Website UTEC Corporation, https://utec.com.sa/)

The most prominent projects of the company

Some of the most prominent projects and partnerships that highlight UTEC's role in the market are: (UTEC Official Website, https://utec.com.sa/)

- Strategic partnership with Schneider Electric to develop modular data centers within the Kingdom, which includes engineering, design, manufacturing, installation, testing, and after-sales technical support. This project aims to localize the data center industry and upgrade local technical skills.
- Implementation of integrated substations for major infrastructure projects in Saudi Arabia, including transportation and renewable energy projects, reflecting the company's ability to manage large and complex projects.
- Production line expansion projects to meet the growing demand for smart inverters and sustainable energy solutions.

Digital Transformation at UTEC

Although UTEC started as a traditional manufacturer of electrical inverters, its expansion towards modular data centers and smart infrastructure systems reflects a clear trend towards digital transformation, and aspects of its digital transformation can be summarized as follows: (https://utec.com.sa/)

- Integrate energy solutions with digital infrastructure: Deliver ready-made and advanced data centers, allowing customers to manage energy and digital infrastructure integrally.
- Continuous Innovation: Partnerships with global organizations such as Schneider Electric promote knowledge transfer, localize technology solutions, and upgrade the Kingdom's capabilities in the field of energy technology.
- Smart Project Management: Adopting upgradeable and upgradable systems and equipment, and supporting engineering and technical processes, providing a high level of operational flexibility and efficiency.
- Sustainability: Focus on renewable and sustainable energy solutions within the company's projects, which are integrated with the requirements of digital transformation and modern technologies.

The impact of digital transformation on quality and service

Digital transformation has contributed to enhancing the ability to control quality and document technical data for each electrical panel produced, which helps in providing accurate reports to customers and ensuring compliance with standards. It has also enabled the factory to improve after-sales service by recording maintenance and inspections electronically, and increasing the speed of response to technical support requests. (Abu Rahma, 2020, p. 56)

Contributions of digital transformation to raising the efficiency of industrial processes:

In recent years, digital transformation has become one of the most important strategic trends adopted by industrial enterprises in various disciplines, as a result of the rapid changes in modern technologies and the high level of competition in global markets, and the development in the fields of artificial intelligence, the Internet of Things, cloud computing, and big data has led to the reshaping of industrial work environments, transforming them from traditional models to intelligent systems based on automation and digital interconnectedness. In this context, digital transformation is no longer a complementary option, but has become a prerequisite for raising the level of operational efficiency, improving quality, and achieving sustainability in production. This transformation is particularly important in industrial enterprises that rely on process precision and complexity of procedures, as it provides them with ample opportunities to improve performance, reduce cost, and promote innovation, making its study and impact analysis a strategic necessity for understanding the mechanisms of manufacturing development in the modern era. (Ismail, 2022, p. 69)

First: Digital Transformation as an Entrance to the Development of the Industrial Operating Environment

Digital transformation has become a key element in the evolution of the work environment within industrial facilities, and has radically changed the way production processes are managed, designed, and monitored. The adoption of digital technologies such as the Industrial Internet of Things, cloud computing, and data platforms has enabled machines and production systems to be connected to intelligent networks that allow for real-time communication and information exchange. As a result, factories are able to improve operational transparency, access accurate and direct data on equipment performance, and measure production indicators in real-time, enhancing management's ability to make faster and more accurate decisions.

Second: Improving operational efficiency and reducing errors and waste

Digital transformation is increasing the efficiency of industrial processes by automating a large number of processes that were once performed manually, reducing the likelihood of human error and increasing the level of accuracy and operational discipline. Digital analytics tools also allow for real-time tracking of the performance of production lines, making it easy to detect shortcomings or downtime before they occur. Predictive maintenance – based on big data analysis and sensors – is one of the most important achievements of digitalization, as it helps identify and fix potential failures before they occur, reducing sudden downtime and ensuring uninterrupted production continuity, thereby reducing the overall cost.

Third: Raising the quality of products and achieving compliance with industrial standards

The changes brought about by digital transformation are not limited to productivity, but extend to the quality of the final product. Through digital quality control systems, each stage of production can be automatically and accurately inspected, ensuring that technical specifications and international standards are in conformity. Real-time and control measurements help reduce defect rates and analyze their causes, contributing to design development, process optimization, and remediation of vulnerabilities in production lines. Digital simulation and digital twin technologies allow equipment performance to be analyzed before any actual modifications are implemented, reducing risk and contributing to the development of products with the highest levels of accuracy.

Fourth: Reducing costs and enhancing the efficiency of resource use

One of the most significant effects of digital transformation is its ability to reduce operational costs by improving resource management, increasing energy efficiency, and reducing waste in raw materials. Interconnected digital systems enable monitoring of energy consumption and identifying activities that consume higher rates than others, helping to improve planning and reduce waste. Smart solutions also contribute to improved inventory management and determining the actual quantities required for production, thus avoiding over-storage or sudden shortages. This, in turn, leads to better management of suppliers and increases overall supply chain efficiency.

Fifth: Supporting innovation and increasing the ability to respond to the market

Through digitalization, factories are able to design more flexible production processes and respond to rapid changes in markets. Artificial intelligence and advanced analytics make it possible to understand customer preferences, anticipate future demand, and adjust production plans accordingly. Digital technologies also help develop innovative products more quickly, and improve electrical panel design processes – such as in the technical factory of distribution panels – through digital modeling and virtual performance testing

before implementation. This raises the competitiveness of a factory in a rapidly changing market and a growing demand for quality and sustainability.

Sixth: Improving employee performance and developing human capital

Digital transformation has contributed to enhancing human capabilities within industrial facilities by providing employees with smart platforms that help them perform their tasks more efficiently. Digital technologies have enabled employees to access information quickly, streamline work procedures, and reduce the time required to complete routine tasks. The implementation of digital training and simulation systems has also raised the skills of workers and enhanced their technical capabilities, which is reflected in the quality of production and the speed of completion. The higher the level of digitalization within the factory, the greater the opportunities to improve employee performance and develop a more efficient and innovative work environment.

Seventh: Supporting Strategic Decisions and Performance Management

Digitization plays a pivotal role in supporting decision-makers within industrial facilities by providing interactive dashboards and accurate analytical reports that enable management to monitor operational and production performance in real-time, and data analysis helps to understand operational trends, identify weaknesses and strengths, and develop strategies based on reliable information rather than estimation or intuition. This enables the organization to improve the efficiency of operations, develop future plans, and direct investments more effectively, fostering sustainable growth over the long term.

Digital Industrial Transformation in the Kingdom of Saudi Arabia according to Vision 2030:

In light of the global acceleration towards the adoption of modern technologies and the technologies of the Fourth Industrial Revolution, the process of digital transformation has become a key pillar for the development of the industrial sector and raising its competitiveness, and the Kingdom of Saudi Arabia has paid great attention to this trend within the goals of Vision 2030, through the adoption of comprehensive digital policies and initiatives aimed at improving industrial processes, including the following: (Ministry of Industry, 2023, pp. 182-186)

1) **The Ministry's Efforts in Enabling Digital Transformation:** The report shows that the Ministry has harnessed extensive efforts to enable digital transformation by developing digital practices, raising institutional maturity, and enhancing capabilities to deal with variables. These efforts aim to create an industrial environment that attracts investment and supports economic growth, while strengthening partnerships with government, private and non-profit entities.
2) **Basic Digitization Grants Initiative:** The Ministry launched the "Basic Digitization Grants" initiative with a funding of 180 million riyals for three years, with the aim of supporting the digitization of factories and raising the level of adoption of digital solutions. This also included the launch of more than 10 systems and websites that support strategic objectives
3) **Government Connectivity and Data Integration:** The Ministry has achieved a significant expansion in government integration, as it has been linked with 67 government entities. This integration is a pivotal part of the digital infrastructure of the industrial sector and the joint data industry between the entities.
4) **Digital Transformation Measurement Program:** The Ministry recorded 87.08% in the Digital Transformation Measurement Program for 2023, which is one of the highest indicators in government entities, and measures the commitment of entities to the standards of digital architecture, services, and governance.
5) **Future Factories Program (SIRI):** The Future Factories Program is one of the most prominent digital transformation programs, as 479 factories were evaluated according to the SIRI global methodology to measure the readiness of factories to shift towards smart manufacturing, in addition to developing 201 digital transformation plans for factories with the aim of raising digital maturity and the shift towards automation and advanced technologies.
6) **Cybersecurity & Digital Training:** As part of its digital transformation efforts, the Ministry has trained more than 200 employees in the fields of cybersecurity, in addition to holding training workshops to enhance the digital awareness and readiness of the sector, which supports the protection of digital systems and processes.
7) **Establishment and operation of the National Center for Industrial Information:** The Ministry has established and operated the National Center for Industrial Information, which provides integrated and unified data, coding systems for factories and products, in addition to developing industrial statistics, dashboards, and innovative digital services to support decision makers.
8) **Raising the quality of industrial data:** The efforts of the National Information Center contributed to raising the quality of data to 96%, in addition to coding more than 466 products for 2000 factories in the NATO database, and implementing more than 72 statistical and analytical reports.

9. Key Findings

By reviewing the literature of the study, experiments, and reports of the Ministry of Industry in the Kingdom of Saudi Arabia, the researcher reached several conclusions, the most important of which are the following:

1) The implementation of digital systems such as ERP and digital design software has improved workflows, reduced time spent on operations, and significantly increased productivity.
2) Digital testing tools and automated quality monitoring have reduced defect rates and documented processes more accurately, enhancing product conformity to technical standards.
3) Predictive maintenance, improved inventory management, and reduced waste in raw materials and time contributed to a clear reduction in the overall costs of production operations.
4) Data systems and analytical dashboards provided accurate and real-time visibility into performance indicators, enabling management to make data-driven

decisions and contributing to improved operational planning and management.
5) Digital transformation has improved the speed of response to customer requests, product customization, and enhanced after-sales services through digital documentation of maintenance and technical support.
6) Digital solutions have simplified tasks, reduced human errors, and improved employee training using technological tools, which has positively impacted job performance.
7) There are challenges facing the factory such as the need to develop digital infrastructure, upskilling workers, and the cost of the initial investment, but the benefits achieved have proven the feasibility of continuing the digital transformation process.

10. Recommendations

1) Continue to develop and expand in-factory digital transformation systems to achieve comprehensive digital integration in production and management processes.
2) Investing in digital quality control systems and enhancing their capabilities to reduce defects and raise the level of conformity of products to technical standards.
3) Enhance predictive maintenance and resource management programs to reduce downtime and achieve higher equipment efficiency.
4) Optimize digital infrastructure including networks and databases to support fast and accurate decision-making.
5) Develop the technical skills of workers through continuous training programs to ensure optimal utilization of digital systems and reduce human errors.
6) Enhance customer experience by expanding digital after-sales solutions and services and developing faster and more effective customer support platforms.

11. Future Proposals

1) Conducting a comparative study between digital transformation and traditional factories to measure differences in operational efficiency.
2) Conducting a study on the impact of digital transformation on employee satisfaction and its role in promoting innovation within industrial facilities.
3) Long-Term Economic Feasibility Study of Investing in Digitalization within Saudi Factories and Strategic Return Analysis.

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