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RESEARCH ARTICLE - MANAGEMENT

The Impact of Digital Transformation in Enhancing Operational Performance: An Applied Study in the Kirkuk Electricity Distribution Branch

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Abstract

Digital transformation is the procedure that integrates recent technologies in organizations to push essential change, improve efficiency, and facilitate work for employees. This paper studies the impact of digital transformation on the operational performance of the Kirkuk Electricity Distribution Branch. Four dimensions of digital transformation will be considered: infrastructure, skills, environment, and digital technology. A descriptive analytical methodology was adopted to examine this impact. A questionnaire of 27 questions was built and distributed to the Kirkuk Electricity Distribution Branch employees. The answers from a convenience sample of 328 male and female employees were collected. These answers were examined using SPSS software and statically tools. The result shows a significant impact of the digital transformation on the operational performance of the Kirkuk Electricity Distribution Branch.

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Keywords: Digital Transformation; Operational Performance; Information Technology; Digital Skill; Technological Environment; Digital Technology.

1. Introduction

The use of digital technology in the field of work is no longer a luxury or addition that distinguishes some international institutions. It becomes one of the necessities upon which all institutional sectors depend.

To achieve digital transformation consistently with its objectives, all parts of the organization must connect and understand the concept of digital transformation in its dimensions and objectives. All these parts should work as an integrated and unified system to achieve digitalization. Digital transformation is only achieved when the entire organization understands the importance of digital transformation, specializes in its culture and elements, and is aware of its goals. Digital transformation is not just a use of technologies or a technical problem. However, it relates to infrastructure, people, and organizational structures [1].

Digital transformation is also an important way out of the outputs of contemporary technology developments. In addition, it is a means to enhance the organization's operational performance quality. It also assists in achieving sustainable development in terms of providing facilities and features that shorten time, effort, and money many times [2, 3]. Many institutions have realized that to be a leader in their field of work, they must pay more attention to the elements of digital transformation and operational performance to be able to provide products that meet customer requirements, on the one hand, and stand in front of competing institutions, on the other hand [4].

Operational performance can be defined as the ability to deliver more output in an organization. Further, it is the class where all business departments cooperate to achieve specific business goals. The constant invention decreased cost and enhanced resource usage is examples of better operational performance [5]. In Arab countries, many companies are still remote from digital transformation [6, 7]. Iraq is one of the Arab countries recently adopting digitization in many sectors. This study aims to examine the impact of digital transformation on operational performance. The Kirkuk electricity distribution branch will be taken as a sample for the study. Therefore, the main objectives of this paper can be summarized:

- Explain the digital transformation process.
- Describe the operation performance.
- Illustrate the main factors that affect the operation performance.
- Study the impact of digital transformation in improving operational performance.

This paper is organized as follows: A background of the impact of digital transformation on operational performance will be represented in Section II. The research questions will be illustrated in Section III. In Section IV, the hypotheses of the study will be presented. The methodology adopted in this study will be illustrated in Section V. The sample and the study questionnaire will be described in Section VI. The result will be presented and discussed in Section VII. This paper will be concluded in Section VIII.

Nomenclature & Symbols			
RQ	Research Question	R	The ratio of the sum of
Anova	Analysis of Variance	KMO	The Kaiser–Meyer–Olkin
OP	Operational Performance	ANOVA	Analysis of Variance

2. Background

2.1. Digital Transformation

Digital transformation refers to the processes that ensure the effective and efficient use of information technology in enabling the organization to achieve its goals. In addition, it transforms the diverse energies of human cadres into a powerful engine that pushes the digital transformation process forward. This transformation is concerned with identifying and implementing processes, structures, and mechanisms that help decision-makers to find the best solution. It can be considered the process of changing from analogue to digital, also known as digital empowerment. The main motives for digital transformation are customer profitability. Indeed, digital transformation allows organizations to achieve greater workforce productivity, increase efficiency, and improve competitive advantage. When taking a proactive digital approach, organizations can take benefit of technologies to achieve business goals, improve opportunities, and improve customer experience [8].

Digital interconnectedness at the level of governments, banks, and individuals helps the public and private sectors work together in a sound environment for better future business. Accordingly, the government in the Fourth Industrial Revolution era must better understand its major role and spend more on creativity and innovation to reconfigure itself again. The government should not be relying on the traditional hierarchical form, but rather it should turn into new platforms that allow better communication with citizens. Governments should focus on developing human capital and skills that add value to countries in the contemporary world.

The digital transformation has an important impact on the industrial revolution. However, many of the digital transformations failed to reach their objectives. The main issue was that various technologies exist, and it is hard to select one of them. Modern organizations may face challenges such as environmental pressure, frequently changing regulatory standards, and pandemics [9]. Therefore, it becomes difficult to deliver customer services at the same prices. Thus, infrastructure companies should work harder and smarter. Infrastructure organizations are striving for assistance from digital transformation. Hence, digital transformation significantly impacts infrastructure to comprehend this better [10].

Many skills are required for performing a successful digital transformation, such as [11].

- Digital Fluency [12]: workers should have basic digital skills to execute and profit from digital transformation. Depending on their positions and the business focus, the demanded skills can vary from basic, like word processing and spreadsheets, to more complex, like understanding cloud computing. To learn the required technologies, workers should perform specific training programs.
- Data Analytics [13]: Digital transformation's main advantage is making more data available to business managers and decision-makers. Indeed, the examination of the huge among of data needs expert analysis. Therefore, Data analysis expertise is essential to an organization's victorious digital transformation.
- Digital Marketing [14]: Marketing skills essential to getting customers and providing financial success of outcomes. Marketing is on the list of the most needed digital transformation skills. Indeed, most of today's marketing has become digital.
- Cybersecurity [15]: As consumer goods merchants, trademarks, and distributors become more digitally linked to global supply chains and consumers, the risk created by cyberattacks grows. Therefore, companies require a cybersecurity expert to ensure the privacy and security of data.

2.2. Operational performance

Operational Performance (OP) represents evaluating a firm's performance using standard or prescribed indicators of effectiveness, efficiency, and environmental responsibility, such as cycle time, productivity, waste reduction, and regulatory observation [16]. Examining operational performance is essential for transforming management data collected from a project into valuable information. This information can then help the manager in decision-making and future actions. It is important to regularly check the operational performance to find ways to progress, to see if the team is on its way, to predict future expected outcomes, and create plans as a result of the investigation [17].

A good operational performance examination will help the business in the [18].

- Assess how the projects function regarding the results achieved and the resources supplied.
- Assess the ability of the project to achieve its goals in the intended budgets.
- Inquire if the major risks have varied and if they are handled efficiently.
- Organize problems and possibilities in financing activities of the project
- Assess if human power is developed as needed.

Operational performance measure aims to address organizational deficiencies and endure that material and human resources are used correctly and appropriately [19, 20].

- Defining goals: It requires identifying the goals that you want to achieve clearly and accurately, using numbers, ratios, and appropriate descriptions such as profitability and added value.
- The production plan: It is the development of an integrated plan that clarifies the financial and human resources, their sources, how to obtain them, and the technical and organizational methods.
- Defining responsibility centres: An organizational unit specializing in performing a specific work has the decision-making authority to manage part of the organization's activity and determine the results.
- Defining operational performance standards: Operational performance evaluation procedures require setting standards for this purpose, a set of standards, ratios, and bases by which the organization's achievements are measured by selecting appropriate criteria. Selecting the most apparent criteria and arranging the selected ratios.

Operational performance measurement is followed to achieve goals, which directly helps evaluate operational performance, improving their performance level.

3. Methodology

The main purpose of this study is to examine the impact of digital transformation on operation performance. For this reason, the following variables will be considered:

3.1. Dependent variable

Operation performance. Independent variable: Digital transformation. The following dimension will be examined:

- Infrastructure
- Skills
- Environment
- Digital technology.

Using the above hypotheses and variables, the following conceptual framework can be deduced (see Fig. 1).

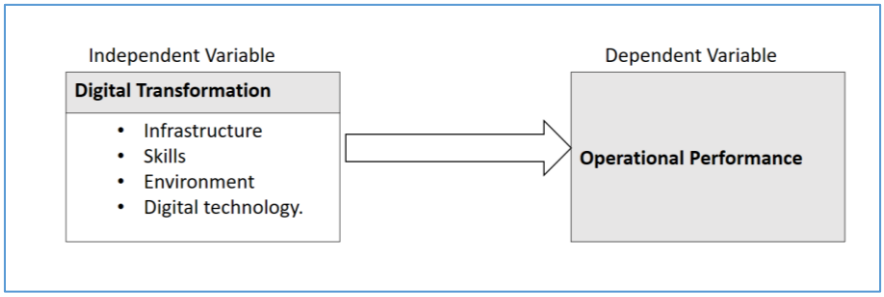

Fig. 1. Conceptual Framework

To study the impact, the descriptive analytical methodology will be adopted. Descriptive analytics is one of the simplest forms of data analysis because it represents impact and relationships without exploring more profound. For this reason, a questionnaire is designed to represent all variables. This questionnaire is distributed to collect data. This data will be used later to examine the hypotheses of the study. The process of this methodology is illustrated in Fig. 2.

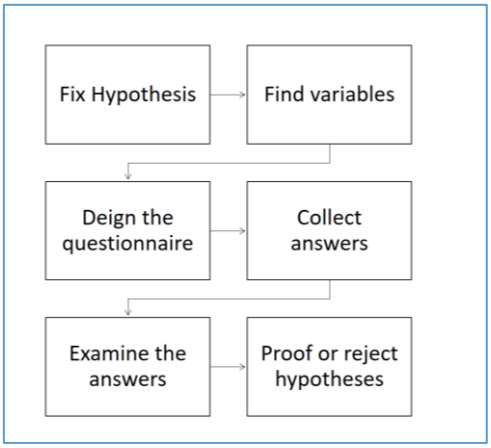

Fig. 2. Steps of applying the adopted methodology

3.2. Research questions

This study will answer the following main question:

RQ: What is the role of digital transformation in enhancing operational performance in the Kirkuk Electricity Distribution Branch?

From this question, other questions can be stems:

- RQ_0: Is there a relationship between IT infrastructure and operational performance?
- RQ_1: Is there a relationship between digital transformation skills and operational performance?
- RQ_2: Is there a relationship between the technological environment and operational performance?
- RQ_3: Is there a relationship between digital technology and operational performance?

4. Hypotheses

The study assumed the following main hypothesis:

H_0: There is a statistically significant impact at the level ($\alpha = 0.05$) between digital transformation and operational performance enhancement in the Kirkuk Electricity Distribution Branch.

The following sub-hypotheses can be derived from the main hypothesis:

- H_{01}: There is a statistically significant effect relationship at the level ($\alpha = 0.05$) between the information technology infrastructure and operational performance.
- H_{02}: There is a statistically significant impact relationship at the level ($\alpha = 0.05$) between digital transformation skills and operational performance.
- H_{03}: There is a statistically significant effect relationship at the level ($\alpha = 0.05$) between the technological environment and operational performance.
- H_{04}: There is a statistically significant effect relationship at the level ($\alpha = 0.05$) between digital technology and operational performance.

5. Sample and Questionnaire

5.1. Questionnaire

The questionnaire used in this study comprises 27 questions distributed on three dimensions, as illustrated in Table 1.

Table 1. Dimensions of the questionnaire

Dimension		Number of questions
Personal Information		3
Digital transformation	Infrastructure	5
	Skill	4
	Environment	5
	digital technology	7
Operational performance		7

The five Likert scale is used with the weight in Table 2 [22].

Table 2. Weights used to represent questionnaire answers

Category	Strongly disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly agree (SA)
Degree	1	2	3	4	5

5.2. Sample

Female employees were chosen. For this reason, 350 questionnaires were distributed and only 328 questionnaires were collected. The response rate is 94%.

Table 3 describes the sample according to sex, age, and education level. This result shows that most of the sample is between 30 and 40 years old. Therefore, the sample is adequate for digital transformation.

Table 3. Sample distribution according to age, sex, and suction level

Variant	Class	Ratio (%)
Sex	Male	53
	Female	47
Age	Younger than 30	12
	Between 30 and 40	57
	Older than 40	31
Education level	Bachelor	25
	Diploma	28
	Master	45
	Doctorate	2

As illustrated in Table 3, 25% of the employees hold a bachelor's degree, 28% of the employees hold a high diploma, 45% of the employees hold a master's degree, and 2% of the employees hold a Ph.D. degree. This result shows that the sample is highly educated. Therefore, they own the information and skills required for digital transformation.

6. Results

This section will present the result of examining the data collected by the questionnaire using SPSS and statistical tools. The following statically tools will be used [21]:

- Mean and standard deviation: The standard deviation represents a resume measurement of the differences between the observation and the mean.
- Cronbach alpha: It is a method that permits the evaluation of the reliability by comparing the value of shared variance, or covariance, between the items making up a tool to the value of overall variance.
- KMO: The Kaiser–Meyer–Olkin (KMO) test is a statistical calculation defining the data's appropriateness for factor analysis.
- ANOVA (Analysis of Variance): It is a statistical tool used to examine the difference between the means of more than two sets.

6.1. Cronbach alpha

The questionnaire stability was computed using Cronbach's alpha to only 30 collected answers. A smaller sample is required to yield a minimum desired effect size. This mini-sample was excluded from the original study sample to confirm a proper analysis. Cronbach's alpha with the associated constancy is illustrated in Table 4.

Table 4. Cronbach alpha value with the constancy

Dimension	Cronbach alpha	Constancy
Infrastructure	.0843	Good
Skills	.0808	Good
Environment	.0839	Good
digital technology	0.926	Excellent
Operational Performance	.0809	Good
Overall	.0870	Good

6.2. *KMO test*

Table 5 shows the KMO values for the dimensions adopted in this study. As illustrated in this table, the sample is adequate for the factors taken in this study

Table 5. KMO values for the dependent and independent variables

Variables	KMO
Infrastructure	0.85
Skills	0.81
Environment	0.88
Digital Technology	0.81
Operational Performance	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.814

6.3. Mean and standard deviation

Table 6 shows the mean interpretation according to the Likert scale used in this study [22].

Table 6. The interpretation of the mean compared to the Likert gradient

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1-1.80	1.81-2.60	2.61-3.4	3.41-4.2	4.21-5
Very Weak	Weak	Moderate	Strong	Very strong

Table 7 shows the mean and standard deviation of all the items in the questionnaire.

Table 7. Means and standard deviations

Variable	Statement	Mean	Standard deviation
Infrastructure	Our branch seeks to benefit from modern technology by developing the infrastructure of information systems	4.14	0.823
	Our branch has technological means that facilitate access and exchange of information	3.86	0.676
	Our branch has a digital system that contributes to improving the performance of electronic services	4.49	0.813
	Our branch has the necessary technology to increase the efficiency of digital information systems	3.97	0.612
Skills	The branch has a digital transformation network that helps speed up work completion.	3.96	0.617
	The employees in our branch have sufficient skills and experience to implement the digital tool strategy	3.83	0.658
	Staff can understand how new digital technology affects the operations of the branch's financial models	4.21	0.795
	The management in our branch seeks to create a fast-moving and highly flexible work environment	4.66	0.815
Environment	The ability to use digital technology, including social media, mobile devices, big data analysis, and cloud computing in getting work done.	4.63	0.787
	The administration seeks to bring in the latest devices, equipment, advanced technology, and physical facilities.	3.96	0.589
	Our branch contributes to introducing new ways of working through the use of information technology.	4.62	0.781
	The available technology capabilities are characterized by the high efficiency required for electronic management	3.94	0.552
Digital Technology	The department is constantly updating computers and devices according to work requirements	4.63	0.77
	The existence of a specialized department for electronic management and technical consulting	4.21	0.735
	Our branch aims to employ technology to serve citizens.	4.65	0.776
	The branch views digital technologies as opportunities to be seized.	4.61	0.782
	The branch views digital technologies as a nonhazardous	4.59	0.711

Operational Performance	The branch makes extensive use of digital technology such as social media	4.34	0.644
	The branch uses digital technology extensively, such as tablets and mobile phones	4.01	0.482
	The branch makes extensive use of digital technology such as cloud computing technology.	4.67	0.627
	Our branch has a clear strategic vision for digital transformation	3.84	0.801
	The administration works to ensure that the outputs conform with the standard specifications	4.22	1.0
	The branch has a strategy centred on benefiting from and analyzing big data	4.41	0.716
	Service costs in our branch are acceptable to customers compared to other branches	3.99	0.547
	The branch seeks to achieve efficient use of the digital resources and technologies available to it continuously	4.32	0.748
	The branch's operational efficiency is high compared to competitors due to the use of digital technologies	4.33	0.708
	The technologies used in our branch have raised the level of technology used in operational digital processes.	4.30	0.753

This table shows the arithmetic means and standard deviations for:

- Infrastructure dimension: The item with the highest importance is "Our branch has a digital system that contributes to improving the performance of electronic services", with an arithmetic mean of (4.49), and a standard deviation of (0.813). While the least important item "Our branch has technological means that facilitate access and exchange of information." with an arithmetic mean equal to (3.86) and a standard deviation of (0.676).
- Skills dimension: The highest importance item is "the administration in our branch seeks to create a fast-moving and highly flexible work environment", with an arithmetic mean of (4.66) and a standard deviation of (0.815). While the least important paragraph is "The employees in our branch have sufficient skills and experience to implement the digital tool strategy", with its arithmetic mean of (3.83), And its standard deviation of (0.658).
- Digital Technology dimension: The item with the highest importance is "The branch uses digital technology on a large scale as cloud computing technology", with an arithmetic mean equal to (4.49) and standard deviation equal to (0.627). However, the item with the least importance is "the branch uses digital technology on a large scale, such as the technology of tablets and mobile phones", with an arithmetic mean of (4.01) and a standard deviation of (0.482).
- Environment dimension: The item with the highest importance is "the administration is constantly updating devices and computers according to the requirements of the work", with an arithmetic mean of (4.63) and a standard deviation of (0.77). While the least important item is "the available technology capabilities are characterized by the high efficiency necessary for electronic management", with its arithmetic mean of (3.94) and its standard deviation of (0.552)).
- Operational performance dimension: As we can see, item number 3 has the highest importance, with an arithmetic mean of 4.41 and a standard deviation of 0.716. The item with the least importance is number 1, with a mean of (3.84) and a standard deviation equal to (0.801).

6.4. Anova test for H_0

Tables 7 and 8 show the result of the ANOVA test for the main hypothesis H_0. As illustrated in these tables.

- The correlation coefficient is 0.861, and the sig value is 0.000, which is less than the significance level of 0.05. Thus, there is a strong relationship between the dimensions of the independent variable and the dependent variable represented by operational performance.
- R square value is 0.741. Therefore, 74.1% of the modification in operational performance is due to a linear relationship with digital transformations.

Thus, the H_0 hypothesis can be held, and there is a statistically significant effect at the level ($\alpha = 0.05$) between transformation and enhancing operational performance in the Kirkuk Electricity Distribution Branch.

Table 7. Model Summary

Std. The error in the Estimate	Adjusted R Square	R Square	R	Model
.32977	.738	.741	.861[a]	1

Table 8. ANOVA[a]

Sig.	F	Mean Square	df	Sum of Squares	Model	
.000[b]	231.301	25.154	4	100.617	Regression	
		.109	323	35.127	Residual	1
			327	135.744	Total	

6.5. *Anova test for H_{01}*

Tables 9 and 10 shows the Anova test for hypothesis H_{01}. As illustrated in these Tables.

Table 9. Model Summary for H_{01}

Std. The error in the Estimate	Adjusted R Square	R Square	R	Model
.46809	.472	.474	.688[a]	1

Table 10. ANOVA[a] for H_{01}

Sig.	F	Mean Square	df	Sum of Squares	Model	
.000[b]	293.541	64.316	1	64.316	Regression	
		.219	326	71.428	Residual	1
			327	135.744	Total	

- The correlation coefficient is equal to 0.688, and the sig value is equal to 0.000. Therefore, there is a strong relationship between the independent variable represented by the information technology infrastructure and the dependent variable represented by operational performance.
- The R square is 0.474. Therefore, 47.4% of the change in operational performance is due to the infrastructure.

All sig values are less than 0.05. Therefore, hypothesis H01 is held, and there is a statistically significant effect at the level ($\alpha = 0.05$) between the information technology infrastructure and operational performance.

6.6. Anova test for H_{02}

Tables 11 and 12 show the result of the ANOVA test for hypothesis H_{02}. As illustrated in these Tables.

Table 11. Model Summary for H_{02}

Std. The error in the Estimate	Adjusted R Square	R Square	R	Model
.44194	.529	.531	.729[a]	1

Table 12. ANOVA[a] for H_{02}

Sig.	F	Mean Square	df	Sum of Squares	Model	
.000[b]	368.999	72.071	1	72.071	Regression	
		.195	326	63.673	Residual	1
			327	135.744	Total	

- The correlation coefficient equals 0.729, and the sig value equals 0.000, which is less than the significance level of 0.05. This indicates a strong relationship between the skill dimension independent variable and the dependent variable represented in operational performance.
- The R square is equal to 0.531. Therefore, 53.1% of the change in skills is due to digital transformation.

All sig values are less than 0.05. Therefore, H_{02} is held, and there is a statistically significant relationship effect at the level ($\alpha = 0.05$) between digital transformation skills and operational performance.

6.7. Anova test for H_{03}

Tables 13 and 14 show the result of the ANOVA test for the H_{03}. As illustrated in this Table.

Table 13. Model Summary for H_{03}

Std. The error in the Estimate	Adjusted R Square	R Square	R	Model
.43614	.542	.543	.737[a]	1

Table 14. ANOVA[a] for H_{03}

Sig.	F	Mean Square	df	Sum of Squares	Model	
.000[b]	387.629	73.733	1	73.733	Regression	
		.190	326	62.011	Residual	1
			327	135.744	Total	

- The correlation coefficient is equal to 0.737, and the sig value is equal to 0.000. Therefore, there is a strong relationship between the independent variable represented by the information technology environment and the dependent variable represented by operational performance.
- The R square is 0.542. Therefore, 54.2% of the change in operational performance is due to the environment.

All sig values are less than 0.05. Therefore, hypothesis H03 is held, and there is a statistically significant effect at the level ($\alpha = 0.05$) between the information technology environment and operational performance.

6.8. Anova test for H_{04}

Tables 15 and 16 show the result of the ANOVA test on hypothesis H_{04}. As seen in these Tables.

Table 15. Model Summary for H_{04}

Std. The error in the Estimate	Adjusted R Square	R Square	R	Model
.45033	.511	.513	.716[a]	1

Table 16. ANOVAa for H_{04}

Sig.	F	Mean Square	df	Sum of Squares	Model	
.000[b]	343.371	69.633	1	69.633	Regression	
		.203	326	66.111	Residual	1
			327	135.744	Total	

- The correlation coefficient is equal to 0.716, and the sig value is equal to 0.000. Therefore, there is a strong relationship between the independent variable represented by digital technology and the dependent variable represented by operational performance.
- The R square is 0.513. Therefore, 51.3% of the change in operational performance is due to the infrastructure.
- All sig values are less than 0.05. Therefore, hypothesis H04 is held, and there is a statistically significant effect at the level ($\alpha = 0.05$) between digital technology and operational performance.

7. Conclusion

This paper studied the issue of digital transformation and its role in enhancing operational performance in the Kirkuk Electricity Distribution Branch. The authors noticed that digital transformation had become a common topic for many economies and government institutions in Iraq. Several commercial institutions and enterprises aim to develop adequate strategies to achieve digital transformation. Kirkuk Electricity Distribution Branch took its first steps towards digital transformation to develop and enhance its operational performance. Digital transformation constitutes a great opportunity to reduce expenses such as using paper, saving time and effort, eliminating corruption, and reducing costs. It also aims to establish a digital economy. It assists individuals and sectors in raising productivity and creating a stimulating business position to attract investments. This paper aimed to study the relationships between digital transformation and operational performance. The following dimensions of the digital transformation were considered: Infrastructure, skills, environment, and digital technology. The authors adopt a descriptive-analytical methodology. For this reason, a questionnaire was created to collect data. After examining these data, the authors conclude that there is a significant impact of digital transformation with its dimension on operational performance.

Digital transformation has become inevitable due to the rapid development of new technologies and the growing volume of information. It is an integrated and comprehensive process that allows the organization's departments to move to a strategy or formal framework desired to control the quality of outputs while preserving the privacy and integrity of data. It assists in satisfying all parties related to the institutional system. For this reason, the following recommendation should be given:

- Developing, supporting, and adopting a digital transformation strategy in the Kirkuk electricity distribution branch.
- Develop comprehensive plans: goals, objectives, activities, processes, material resources, technology, necessary funding sources, and a time for digital transformation in the branch under study.
- The need to involve employees in the digital transformation.
- Work to use an integrated set of financial and non-financial measures, including operational performance indicators, to provide a clear and objective picture of the results of the branch's performance, such as quality, flexibility, productivity, and innovation.
- Employees should be trained to use recent technology in the Kirkuk Electricity Distribution Branch under study.

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