



# مجلة الدراسات السياسية والاقتصادية Journal of Political and Economic Studies Faculty of Politics and Economics Suez University



مجلة علمية محكمة  
(نصف سنوية)  
تصدر عن  
كلية السياسة والاقتصاد  
جامعة السويس

تأسست المجلة عام 2021

print Issn :2805-3028

ONLINE ISSN :2805-3036



<https://psej.journals.ekb.eg/>

السنة (٤)

العدد (١)



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الآراء الواردة داخل المجلة تعبر عن وجهة نظر أصحابها  
وليست مسؤولية كلية السياسة والاقتصاد جامعة السويس

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الترقيم الدولي الموحد للطباعة: 3028-2805

الترقيم الدولي الموحد الإلكتروني: 3036-2805





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مجلة علمية متخصصة في الشؤون السياسية والاقتصادية  
مجلة معتمدة من بنك المعرفة المصري



موقع المجلة على بنك المعرفة المصري  
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العدد (١) - السنة (٤)

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تصدر نصف سنوياً

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تأسست المجلة عام 2021

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# Digital Transformation as a key for achieving Sustainable Development: An Empirical Study on the Egyptian Banking Sector

التحول الرقمي كأداة لتحقيق التنمية المستدامة: دراسة تطبيقية على القطاع  
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## **Abstract**

**Purpose:** The numerous benefits and challenges posed by the new digital era heighten the urgency with which enterprises must implement digital solutions (Martinez, 2019). Because of the quick pace of change, a generic technique was developed to provide practitioners with ideas and information on the process of introducing digital features. Digital transformation enables access to a network of connected, untapped big data, which has the potential to benefit both society and the environment. By proactively tackling concerns related to the United Nations' Sustainable Development Goals (Mondejar et al., 2021), such as creating an egalitarian, environmentally sustainable, and healthy society, the development of digital smart systems connected to the internet of things can create new opportunities.

**Finding:** The study's findings show that the new instruments created by digital transformation must be carefully balanced in terms of intelligent use and environmental, social and economic impact. The ability to make informed decisions about how to use resources and services more effectively has a significant impact on sustainable development, which is influenced by digital transformation by generating competitive advantages, value addition, internal efficiency, and cost savings.

**Practical Implications:** The study's findings could help bank managers understand how to deploy new technology. Managers

may be driven to embrace new technology and improve their digital abilities to maintain their companies' long-term viability. This research adds to the body of knowledge by bridging a knowledge gap and giving empirical proof of the empirical influence of digital transformation on achieving sustainable development in the Egyptian banking sector.

**Keywords:** Digital transformation, Industry 4.0, sustainable development, social, economic and environmental sustainability.

## المُلخص

**الهدف:** تزايدت أهمية الاعتماد على التحول الرقمي في المؤسسات بشكل مُلحّ بسبب الفوائد الكبيرة والتحديات التي يفرضها العصر الرقمي الحديث (Martinez, 2019). ومع تسارع وتيرة التغيير، تم تطوير نهج شامل لتزويد الممارسين بالإرشادات والرؤى المتعلقة بكيفية الاستفادة من الميزات الرقمية بفعالية. التحول الرقمي يُتيح إمكانية الوصول إلى شبكة مترابطة من البيانات الكبيرة غير المُستغلة، مما يسهم في تحقيق فوائد للمجتمع والبيئة. من خلال معالجة القضايا المرتبطة بأهداف الأمم المتحدة للتنمية المستدامة (Mondejar et al., 2021)، مثل تعزيز مجتمع عادل ومستدام، يمكن للأنظمة الرقمية الذكية المتصلة بإنترنت الأشياء فتح آفاق جديدة من الفرص.

**النتائج:** تشير الدراسة إلى أن الأدوات الجديدة الناتجة عن التحول الرقمي تحتاج إلى توازن دقيق لضمان استخدامها بذكاء، مع مراعاة التأثيرات البيئية، الاجتماعية، والاقتصادية. إن القدرة على اتخاذ قرارات مستنيرة بشأن كيفية استخدام الموارد والخدمات بشكل أكثر كفاءة له تأثير كبير على التنمية المستدامة، حيث يوفر التحول الرقمي مزايا تنافسية، وقيمة مضافة، وتحسيناً للكفاءة الداخلية، إلى جانب خفض التكاليف.

**التطبيقات العملية:** يمكن أن تساعد نتائج الدراسة مديري البنوك على فهم أفضل لكيفية اعتماد التقنيات الحديثة. كما يمكن أن تشجعهم على تحسين مهاراتهم الرقمية لضمان استدامة مؤسساتهم على المدى الطويل. تضيف هذه الدراسة إسهاماً جديداً إلى المعرفة من خلال سد فجوة معرفية، مع تقديم أدلة عملية على تأثير التحول الرقمي في تحقيق التنمية المستدامة في القطاع المصرفي المصري.

**الكلمات المفتاحية:** التحول الرقمي، الثورة الصناعية الرابعة، التنمية المستدامة، الاستدامة الاجتماعية، الاقتصادية، البيئية.

## **1. Introduction**

### **1.1. Introduction**

The impact of information technology on organizational relationships has been a source of debate as digital transformation has emerged as a prominent megatrend in the twenty-first century. This study assessed the impact of digital transformation on attaining sustainable growth in Egypt's banking sector, assisting managers and stakeholders in reaching the intended goals. Furthermore, by using the analysis, enterprise managers and other stakeholders will be able to achieve the outcomes they expected from implementing digital transformation during the fourth industrial revolution, in which this study aims to characterize the impact of digital transformation on achieving sustainable development.

Digital transformation is the process of converting a printed analogue into a computerized representation (Panda, 2009). The world is entering a digital age, in which most of our daily activities rely largely on cutting-edge digital and computer technologies. Modern technologies are being used to boost productivity and efficiency in domains such as socioeconomics, the environment, sustainable development, and climate research (Mondejar et al., 2021).



Best management practices for organizations Addressing social and environmental challenges will help to maintain sustainability.

Metaxas et al. (2016)

Thus, the goal is to determine the extent to which digital transformation affects sustainable development.

### **1.2. Importance of the research**

The study's relevance can be summarized as follows:

First, the researcher examines the literature on the impact of digital transformation on attaining sustainable development. As a result, the current study will add to the discipline.

Second, the research will provide organizations with valuable guidance on how to preserve digitization and achieve institutional superiority above their competitors.

Third, this work may give other researchers suggestions for future research in this critical field.

### **1.3. Research problem**

The findings of the literature research demonstrate that the existing available content is widely scattered and badly indexed. There isn't much research on digital transformation and sustainable development. The use of services and manufacturing to cut costs and improve financial performance has recently grown in favor. The goal is to boost productivity and competitiveness,

allowing us to compete in the current fourth industrial revolution. It is critical to investigate how digital revolution affects sustainable development. If firm managers and other stakeholders understand these dynamics, they will be able to obtain the desired benefits from digital transformation.

#### **1.4. Research Questions**

The following three questions summarize the research questions  
How can Egypt's banking system ensure long-term sustainable development?

How can Egypt's banking sector implement and develop digital transformation?

What role does digital transformation play in attaining sustainable development in Egypt's banking sector?

#### **1.5. Research Objectives**

The study's goal is to research and assess the impact of digital transformation on sustainable growth in Egypt's banking sector. The research aims to achieve the following goals:

1. Clarifying the role of Egypt's financial industry in sustaining sustainable growth.
2. Clarifying the banking sector's tools for digital transformation.
3. Being aware of the link between digital transformation and sustainable development in Egypt's banking sector.

## **2. Theoretical Background**

### **2.1. Digital transformation's significance and benefits**

The digital business model and institutional excellence. Technology alone will not enable a company to survive in a rapidly changing competitive market (Metaxas & Koulouriotis, 2014; Oakland, 2005). Instead, implementing a structured digital strategy has a significant impact on business objectives and investments by changing, adapting, or expanding current resources, processes, and values on a systematic basis using established change routines, allowing the organization to perform better than before (Savastano et al., 2021).

The goal of information professionals has always been to deliver the right information to the right user at the right time. Recent advances in information and communication have caused significant change. These technologies are critical in decreasing the challenges associated with using information as quickly as possible (Khan, 2015).

According to Khan (2015), the primary goals of digitization are to improve document accessibility. By digitizing their information, organizations may make it available to a wider range of users. Digitization's primary goals are to increase access and preservation, and institutions can digitize entire organizations.

According to (Katuu, 2020), the major goals of digital transformation are often access or preservation. When facilitating

access is the goal, the perceived benefits include by broadening the geographic scope and enabling full-text search, the asset's informative value would be expanded beyond descriptive data and into content. Furthermore, the ability to access data on the same information asset from a range of sources.

Furthermore, digitization can increase process efficiency, reduce expenses, and boost firm sustainability (Dizaji, 2022).

The researcher concludes that digitizing your company's records will result in cost savings. Your company's efficiency will improve because of digital transformation, and records will be safer from theft or loss in the case of a natural disaster and easier to recover.

## **2.2. Sustainable development: conceptual framework**

The World Commission on Environment and Development (1987) defines sustainable development as "development that meets the needs of the present generation without jeopardizing future generations' ability to meet their own needs." (Ioannis N Metaxas, 2016).

- (Marco Savastano, 2022). It states that an organization must have a sustainable development culture to achieve its primary strategic goals during both calm and turbulent times. According to the researcher, sustainable development is the foundation for

developing strategies for businesses to grow sustainably. To achieve sustainable growth, a corporation must prioritize three societal pillars: social responsibility, economic progress, and environmental protection.

### **2.3. The relationship between digital transformation and sustainable development**

Digitalization refers to the application of digital technologies to promote sustainability and quality. Digital technology and procedures are used to promote sustainability by minimizing environmental impact and enhancing resource efficiency. Furthermore, digitalization has a clear economic and societal benefit by cutting unemployment, improving quality of life, and increasing access to information and other public services. The digitization process is distinguished by cost-effectiveness in the production, management, and interchange of information, all of which contribute to long-term economic progress.

#### **2.3.1. The Relationship between digital transformation and Economic Sustainability**

According to Khan (2015), "transparency and efficiency, though not simultaneously, has a dramatic impact on economic growth." The concept of digitization is introduced because of technological advancements in information and communication technologies.



The advent of the Internet has made a vast amount of knowledge available to everyone, resulting in a shift in how information is presented to the general public from print to digital media. Digitization creates, manages, disseminates, and stores an increasing amount of knowledge digitally. The economics of digitalization can be divided into two sections. The first question is about the cost-effectiveness of digitization. Second, it has an impact on national economies (Khan,

As a result, both developed and emerging countries view the digital economy as the primary source of economic growth. The digital economy helps to cut the cost of goods and services while enhancing labor and capital efficiency.

### **2.3.2. The Link Between Digital Transformation and Social Sustainability**

The fragmented knowledge regarding the societal transformation attributed to Industry 4.0 can be used to gain a broad grasp of the fundamental issues in this transformative process. A thorough investigation of the situation was consequently required (Grybauskas, 2022).

During these types of societal transformations, managers must consider how their firms' actions will affect society. When viewing marketing through a systems lens, all entities—people, organizations, and society—are interconnected (Jovanovich, 2018).

As a result, technological advancement also drives  
As a result, technological advancement drives and shapes  
civilization. When making technological selections, consider both  
the costs and the rewards.

### **2.2.3. The Relationship between Digital Transformation and Environment Sustainability**

According to Cinzia Cappiello et al. (2013) and Recker et al. (2012) (quoted in Grazia Francesca, 2020), digitalization promotes efficient resource use and reduces environmental effect. Other factors, such as organizational slack, manufacturing capacity, competent human resources, and innovation aptitude, can have a favorable impact on a company's ability to sustain itself. One of the benefits of an organization's effective adoption of digitalization is increased innovation potential, which is one of the variables that contribute to sustainability. The relationship between digitalization and the firm's sustainability can be

The relationship between digitalization and company sustainability can be seen as causal. (Dizaji, 2022). As a result, digital transformation has increased production and efficiency across all industries, while carbon emissions from public services, building and planning, transportation, and agriculture have been significantly decreased.

## **3. Research Hypotheses and Methodology**

### **3.1. Research Hypotheses**

# **H1: Digital transformation has no significant impact on achieving Sustainable development in the Egyptian Banking Sector.**

From the main hypothesis, there are three sub hypotheses:

H1.1. Digital transformation has no significant impact on achieving Social Sustainability in the Egyptian Banking Sector.

H1. 2. Digital transformation has no significant impact on achieving Economic Sustainability in the Egyptian Banking Sector.

H1.3. Digital transformation has no significant impact on achieving Environmental Sustainability in the Egyptian Banking Sector.

## **3.2. Research Methodology**

Measuring digital transformation should incorporate a variety of measurements that capture not only technology penetration but also its application to understand the overall impact of digital transformation.

Sustainable development is measured in terms of economic, social, and environmental sustainability. The data for this study were acquired through semi-structured interviews for the qualitative component and a questionnaire for the quantitative component.

However, the responses were analyzed using simple and multiple regression analysis.

### **3.3. Study Population and Sample**

#### **Population**

Employees from several administrative departments in Egypt's banking sector make up the research community in this study, according to (CAMPAS 2022), Egypt has 38 banks, including government, private, and Egyptian branches of international Islamic and commercial banks.

#### **Sample**

The sampling technique used in this investigation was a basic random sample. To gather sample replies, the researcher distributed an internet questionnaire to Egypt's banking sector. There were 386 replies; the sample included all Egyptian banking sector personnel.

## **4. Results and Discussion**

### **4.1. Reliability and Validity**

**Table (1) Reliability “Cronbach’s Alpha Coefficient”**

Scale	No. Of Items.	Alpha Coefficient
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Digital transformation has no significant impact on achieving Sustainability in the Egyptian Banking Sector.	16	.859
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Table (1) demonstrates that the reliability coefficient is deemed acceptable, since it exceeds the benchmark to 0.7, thus the study instrument is reliable.

**Table (2) Validity Table**

Scale	N	Self-Validity Coefficient
Digital transformation has no significant impact on achieving sustainable development in the Egyptian Banking Sector.	16	0.867

- According to the results, the self-validity coefficient is equal to 0.8, which is a high acceptable number.
- Based on previous results the researcher concluded that the study instrument is Reliable and Valid.

#### **4.2. Descriptive Analysis Measures the impact of digital transformation on achieving sustainable development in the Egyptian banking sector.**

Table (3) Descriptive Analysis measures the impact of digital transformation on achieving sustainable development in the Egyptian banking sector.



	N	Mean	Std. deviation	Rank
<b>Economic Sustainability</b>				
Economic development is necessary for sustainable development and excellence	386	4.24	.756	3
The organization provides its customers/users with complete and precise information on products/services	386	4.08	.744	5
Formulate an ethical code of conduct for anti-corruption and bribery	386	4.28	.667	2
Sustainable development and excellence require that we humans reduce all kinds of waste	385	4.39	.669	1
Sustainable development requires affair distribution of goods and services among people in the world	386	4.21	.728	4
<b>Social sustainability</b>				

	N	Mean	Std. deviation	Rank
The organization has clear management responsibilities with diversity in its members	386	4.11	.689	3
Your organization Organize the establishment of social responsibility awareness and participation in activities for all, and support and improve the relevant communities	386	4.11	.759	3
Your organization Improved relationship with the community and stakeholders	386	4.21	.677	2
Your organization Encourage the development of employee skills	386	4.03	.712	4
Improved living quality of surrounding community will Improve job satisfaction levels of employees	386	4.28	.671	1

	N	Mean	Std. deviation	Rank
The organization encourages employees to participate in volunteer activities	386	4.02	.834	5
<b>Environmental Sustainability</b>				
The organization operates in compliance with laws and regulations, as well as environmental protection regulations	386	4.25	.725	1
Existence of pollution prevention programs like cleaner production	386	4.00	.795	2
Generate environmental reports for internal evaluation Sustainable performance dimensions	386	3.98	.868	3
The organization implements specific programs to reduce its environmental impact	386	3.94	.822	5

	N	Mean	Std. deviation	Rank
The bank possesses one of the environmental commitment certificates, such as the Trashed certificate or an ISO accreditation for a quality management system.	386	3.97	.851	4

A conclusion that can be drawn from Table 3 is that most sample respondents agree (either entirely or fairly) with all the most critical issues about the impact of digitization on achieving sustainability.

- Digital transformation impact on achieving Social Sustainability in the Egyptian Banking Sector.
- Digital transformation impact on achieving Economic Sustainability in the Egyptian Banking Sector.
- Digital transformation impact on achieving Environmental Sustainability in the Egyptian Banking Sector.

#### **4.3 Testing Hypotheses**

The Main hypothesis states that:

**H1: Digital transformation has no significant impact on achieving Sustainable development in the Egyptian banking sector.**

This hypothesis can be divided into three sub- hypotheses as follows:

H1.1. Digital transformation has no significant impact on achieving Social Sustainability in the Egyptian Banking Sector.

H1.2. Digital transformation has no significant impact on achieving Economic Sustainability in the Egyptian Banking Sector.

H1.3 Digital transformation has no significant impact on achieving Environmental Sustainability in the Egyptian Banking Sector.

- The relationship between an independent variable (digital transformation) and a dependent variable (sustainable development) is statistically examined using either correlation or regression. Both strategies require that the two variables be measured independently. The influence of digital transformation on attaining sustainable development in Egypt's banking industry is measured by a series of items in this study's questionnaire, without distinguishing between the variables. Correlation and regression analysis are thus impossible. Instead, two different methods are used:



- The Chi-square Test can be used for each item. It assesses the significance of changes in the frequency of different levels of agreement with the item. The question may be judged correct (or the effect may be significant) if the test results are significant and most frequencies are given to both "agreed" and "totally agreed" responses.
  - one-sample T-Test is used to assess the impact of digitalization on sustainability, which is measured using Likert-type questions. The effect may be considered significant if the test result is significant and the variable's mean value is more than 3.
- Table 4 shows the frequency distribution and response rates of sample responders to each question, using the Chi-square Test.

"The impact of digital transformation on sustainable development." Most of the sample's respondents agreed with every item, with an overall agreement rate ranging from 59.3% to 98.8%.

Table 4 Results of Chi-square test results

Impact of digital transformation on achieving sustainable development		Respondents' answers					Chi-square test	
		Not agree	Not agree	Neutral	Agreed	Totally agreed	$\chi^2$	Sig.
Economic	n	2	65	48	175	155	382.6	0.0

development is necessary for	%	0.5	1.3	12.5	45.5	40.3	90 <sup>a</sup>	00
The organization provides its customers/users with complete and precise	n	2	7	66	199	112	378.352 <sup>a</sup>	0.000
	%	0.3	1.8	17.1	51.7	29.1		
Formulate an ethical code of conduct for anti-corruption and bribery	n	2	41	93	150	100	295.419 <sup>a</sup>	0.000
	%	0.5	10.6	24.0	38.8	25.9		
Sustainable development and excellence require that we humans reduce all	n	7	3	11	225	140	276.625 <sup>a</sup>	0.000
	%	1.8	0.7	2.8	58.2	36.2		
Sustainable development requires affair distribution of goods and services	n	2	58	81	144	101	435.039 <sup>a</sup>	0.000
	%	.5	15.0	20.9	37.3	26.1		
The organization has clear management responsibilities with	n	3	63	107	112	101	390.668 <sup>a</sup>	0.000
	%	0.7	16.3	27.7	29.0	26.1		
Your organization Organize the establishment of social responsibility awareness and	n	1	1	82	170	132	314.763 <sup>a</sup>	0.000
	%	0.3	0.3	21.3	44.2	34.0		
Your organization Improved relationship with the community	n	1	53	106	106	120	342.710 <sup>a</sup>	0.000
	%	0.25	13.7	27.4	27.4	31.0		
Your organization Encourage the development of	n	1	89	93	102	101	271.908 <sup>a</sup>	0.000
	%	0.2	23.0	24.09	26.4	26.1		
Improved living quality of surrounding community will Improve job	n	1	45	86	153	100	293.550 <sup>a</sup>	0.000
	%	0.25	11.6	22.2	39.6	25.9		

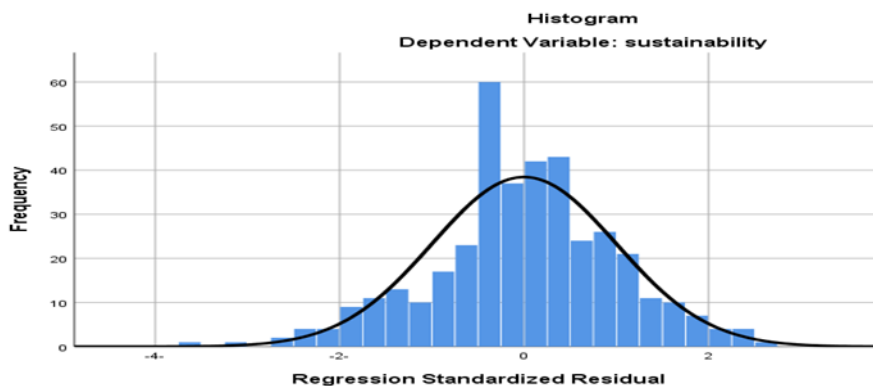
The organization encourages employees to participate in volunteer activities	n	1	9	72	131	101	328.9 19 <sup>a</sup>	0.0 00
	%	0.25	2.33	18.6	33.9	26.1		
The organization operates in compliance with laws and regulations, as	n	4	41	32	126	110	334.4 82 <sup>a</sup>	0.0 00
	%	1.03	10.6	8.29	32.6 4	28.4		
Existence of pollution prevention programs like cleaner production programs	n	15	142	102	57	70	331.4 74 <sup>a</sup>	0.0 00
	%	3.8	36.7	26.4	14.7	18.13		
Generate environmental reports for internal evaluation Sustainable performance	n	9	1	70	107	199	260.8 81 <sup>a</sup>	0.0 00
	%	2.3	0.25	18.1	27.7	51.5		
The organization implements specific programs to reduce its	n	33	25	84	129	115	295.0 45 <sup>a</sup>	0.0 00
	%	7.5	1.29	21.7	46.6	22.7		
The bank possesses one of the environmental commitment certificates, such as	n	2	11	70	150	81	308.5 29 <sup>a</sup>	0.0 00
	%	0.5	2.84	18.1	38.8	20.9		

<sup>a</sup>:Min \_max

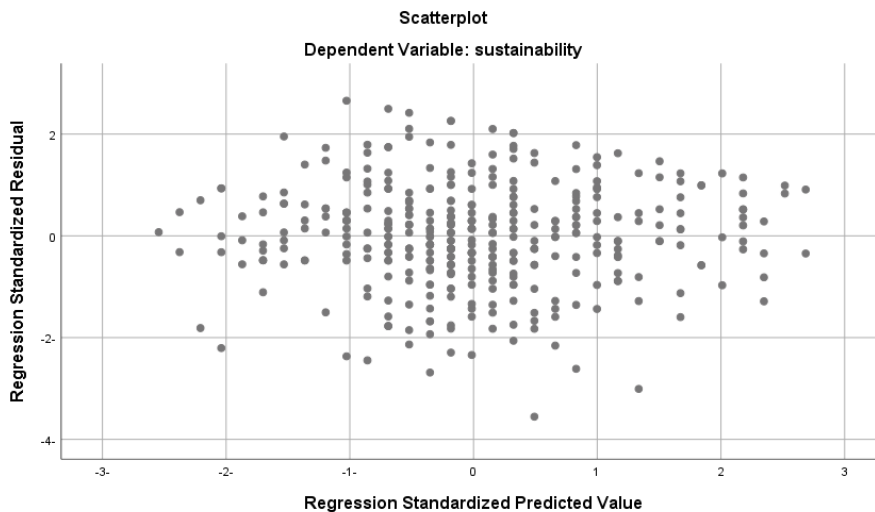
The Chi-square test was performed to investigate the frequency differences associated with various levels of agreement with each question. The findings revealed considerable disparities in the frequencies ascribed to the various levels of agreement on the significance of digital transformation in accomplishing sustainable development goals. The differences were statistically significant (Sig < 0.05). The results also revealed differences in the

frequencies assigned to the statements "There is an impact of digitization on achieving social sustainability," "There is an impact of digitization on achieving economic sustainability," and "There is an impact of digitization on achieving environmental sustainability."

And thus, the main hypothesis and Its sub hypotheses are rejected.



**Figure 1 Histogram of Frequency for Sustainable development**



## Figure 2 Scatterplot Diagram of regression for Sustainable development

Table 5 Result of T-Test for the Main hypothesis

Variable	Mean	S.D.	T-Test	
			T	Sig.
The impact of digital transformation on achieving sustainable development in Egyptian banking sector	4.14	.439	83.751	0.000

From table 5 it could be shown that:

- The mean value for the variable "the impact of digital transformation on achieving sustainable development is 4.14 ( $> 3$ ) with a standard deviation of 0.439, this value is considered significant at the 5% level (Sig.  $< 0.05$ ).
- Based on the previous results, it could be concluded that the "impact of digital transformation on achieving sustainable development" is significant. Accordingly, **The Main hypothesis is rejected, and (H1.1, 1.2, 1.3) are rejected.**

### 4.4 Conclusions

The fourth revolution has had a tremendous impact on the banking sector, with technological developments driving expansion and establishing new markets. The term "Digital Banking" may appear vague, yet it's a fact that many people have converted from traditional banking without realizing it. The digital revolution has



cut information collecting, management, and distribution costs, affecting organizations and improving value-added operations.

Digital Banking enhancing Personal touch and connection make banking more accessible and understandable. However, the fact is far simpler. The bulk of us likely shifted from traditional to digital banking without realizing it. The economy is transforming in reaction to the digital age. Every organization must deal with its consequences. The cost of getting, organizing, and disseminating information has dramatically lowered, transforming the way we do business. Digital transformation has a substantial impact on sustainable development, and Its dimensions which affects value-added processes, and firms may use it to gain an advantage over competitors.

#### **4.5 Recommendations &Implications**

1. Promoting and enhancing an online culture. Adapting to changing conditions, succeeding in your job, and broadening your personal development require the ability and dedication to constantly acquire and use new knowledge and abilities.
2. Embracing new technical advancements. The disparity between technical promise and actual implementation is particularly concerning in an era of fierce global competition.

3. Strengthening cybersecurity defenses.

While new technology is associated with increased safety and security, the company must determine its marketing plan.

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