

# The Impact of the Digital Economy on International Trade, the Case of Egypt for the Period (1990-2020)

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## ABSTRACTS

Recent economic changes in technology and information have led to reliance on newer technologies to keep pace with the rapid development occurring worldwide in all the different economic sectors called the digital economy. Therefore, the digital economy is considered one of the main pillars on which it depends greatly in the present and future times because it contributes to the development of the country's domestic product and thus improving its international trade at the level of international competition because it is a knowledge economy that relies mainly on technology and its advanced means. Therefore, international trade trends changed in light of the digital economy, so modern theories were formulated and developed in line with the transformations that occurred in modern international trade. The digital economy merged with international trade, leading to a clear discrepancy between all countries, each according to its circumstances. It led the developed countries to move towards new patterns in production, international competition and the division of international labor, which created new advantages in international trade in light of the digital economy. The research aims to identify the impact of the digital economy on international trade, the case of Egypt over the past three decades, and the variation of its impact in light of the new economic trends and their requirements, as well as the legal analysis.

**Keywords-** digital economy, international trade.

## I. INTRODUCTION

The tremendous development in means of communication and technology has led to the emergence of new patterns of international commercial dealings using modern electronic and digital means, which has led to changing the concept of the traditional economy to the concept of the digital economy. The emergence of new formats and opportunities for international business through the digital economy and the expansion of cross-border trade and invisible employment. Positive through the intertwining of productive, financial and commercial technology, digital means and technologies of the service sector, global communication and information networks, as any individual or any productive institution can exchange information with any other party in the world and then the economy becomes information technology and means of communication a product of development, that the current era is The era of the digital

economy. The great interest in this digital transformation in developed and developing countries, so technological development has made a huge leap forward. Especially East Asian countries such as Singapore and Malaysia, as they enjoyed a high level of development of the digital economy, which puts them at the top of many global indicators. As for the Arab countries, it is difficult for them to move from the traditional economy to the digital economy for many reasons, including the weakness of the information and communication technology infrastructure. , neglecting investment in research and development, lack of adequate technical support and care for Education, and lack of real political will to adopt this digital transformation, that the successful transition to the digital economy is a way to bridge the widening gap of economic and social backwardness, which requires Arab countries to formulate and implement Clear strategies to achieve this transformation in order to promote economic and social development, and reduce

the risks of the digital divide between developed and developing countries.

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## II. LITERATURE REVIEW

The digital economy helps increase national economies to integrate into the developed global economy and keep pace with the times by increasing the provision of trade opportunities and access to global markets and various sectors in a shorter and faster time frame than in previous countries. As the digital economy depends primarily on human minds, and other factors related to harmony and contemporary life are more supportive than effective or basic motives, and the digital economy does not represent the use of computers to perform traditional or manual tasks, but it shows all the opportunities and the urgent need for economic institutions and their employees to use technologies digital technology in order to do a better, higher-quality

job over time of these tasks. Some economic theorists have defined the digital economy as that economy that relies mainly on information technology, and information technology means every stage of information manufacturing, starting from culture, training and teaching, through the manufacture of physical computer parts and components, ending with the manufacture of computer programs or that depend on the computer in one way or another (Rafiq 2021). While others defined it as that economy that is based on digital information technology, and employs it to manage the entire economy, as a new resource for the knowledge revolution, and a source of inspiration for new innovations (Al-Razo, 2006).

The shift from a traditional or physical economy that relies on natural resources to a digital economy that relies heavily on information and communication technology and human capital requires a set of factors, the most prominent of which are:

**A- Information and Communication Technology (ICT):** Building the technological infrastructure within the framework of the digital economy depends mainly on investing in information and communication technologies, especially the software industry and automated media equipment, as it is an innovative industry that requires drawing, preparation, design, implementation and re-application. Testing computer operating procedures, which consists of a set of commands and instructions that make the computer perform a comprehensive set of operations to achieve a specific result, and one of the strengths in this industry is that it depends mainly on human thinking and its production cannot be determined by time or place, and it is subject to an integrated marketing system, the absence of environmental pollution factors, its high and rapid income, and the competition of foreign markets, according to a report of the United Nations Council for the Advancement of Women. Science and Technology for Development (UNCSTD) hopes to integrate into the development of a knowledge economy; China should focus on ICT issues to raise its country to the ranks of developed countries (Abbas, Ali, 2020).

**B- Education and the Information Society:** Spending on Education was previously seen as consumption, but investment in human capital now has a great impact on economic development, and with the digital economy, there is a focus on activities that require more people to participate, especially the intellectual intensity that is related to the aspect Education because it is an area in which the digital economy industry develops and requires human energy in developing countries. The use of information technology to support the educational process, whether formal or informal, provides enormous potential for developing individual capabilities and for making Education closely related to the requirements of the digital economy, and accordingly, we should focus on Creative and innovative individuals (Abbas, Ali, 2020).

**C- Research and development:** The digital economy relies heavily on research and development laboratories, as the governments of many developed countries attach great importance to research and development as one of the main pillars for entering the digital economy, and this explains the high percentage of spending on research and development as part of the gross domestic product (GDP). GDP in most developed countries, and the rise of this percentage is among the indicators of the digital economy in these countries. The government and the private sector in developed countries share roles by spending on research and development projects. The private sector finances projects that can generate profits over five years or less. As for projects that achieve profits within ten years or more, they will be funded by the public sector or the government, while projects that are expected to achieve profits during the period between (5) and (10) years, their financing will be jointly between the public and private sectors. And based on this organization financing research and development projects, there will be a large financial return on the digital economy (Ghadeer, 2010).

**D- Globalization:** Globalization can be seen in our time. Globalization has created an infinite market, and markets in all their forms are no longer confined within the borders of a specific country, as well as global trade. It can be seen that most countries of the world, especially industrial countries, are in the process of development, especially China, competing to enter new global markets as well as their local markets to secure their presence in all global markets. Also, economic globalization did not shorten places only, but rather time and time, because work time becomes continuous every day and every day of the year, that is, companies and institutions must follow the global work curve in order to compete in the market and remain in the competitive market, which is the embodiment of globalization in all aspects. The digital economy is characterized by its expanded markets, mature products, and its dependence mainly on information and communication technology (Ali, 2018).

**E- The contemporary scientific and technological revolution:** Because technology is closely related to the digital economy, technology is one of the driving forces of the digital economy, because technology is one of the manifestations of knowledge and a catalyst for the permanent development of the future digital economy. With the advancement of digital technology, it led to the development of scientific research.

May, in turn, led to an increase in the accumulation of capital and the creation of competition between companies by applying scientific ideas on the ground. The practical practice of engineers and scientists, technology also helps to maintain industrial production, but with good quality, high production efficiency and low cost, and most importantly, That technological change has made a significant impact on the level of knowledge, which makes it (i.e. knowledge)

contribute to two basic functions: the first is research and development to generate new knowledge, and the second is the dissemination of knowledge through a series of knowledge and technological accumulation (Alami, 2013).

In order to achieve the purpose of the study, the study focused on how the variables and indicators of the digital economy affect international trade. Greater than the previous one, as well as increasing spending on Education and health to increase the human development index. In addition to the introduction, the study consists of three other sections: literature reviews, data and methodology, and conclusion. The study variables are:

**1- The first variable is economic globalization:** With the beginning of World War II, the global economy went through many changes over many years. The world began to feel its effects, especially the disappearance of geographical and customs barriers and borders, and progress in communication technology. The most prominent of these changes affected international trade and changed its structure. Including the trend of economic globalization or global economic integration, global economic relations have become the focus of attention of companies all over the world, especially with the emergence of new concepts related to international trade and the emergence of new global powers in the arena of global competition and control of global trade. Economic globalization, as a term, is intended to generalize things, expand their circle, and include all things in the global scope, that is, from a limited framework to an unlimited framework. The limited here refers to the borders of the state - the state of control, the geographical and political borders, and the protection of the interior from any external interference, while the meaning of the infinite world or universality, and the meaning of that is the abolition of the borders of the national state in the economic field (financial and commercial).

**2- The second variable is foreign direct investment:** There are many definitions of foreign direct investment. As defined by the International Monetary Fund (FMI): It is the investment that is carried out for the purpose of obtaining a permanent interest in a project that is managed by a country other than the country to which the foreign investor belongs, and he has 10% of the ownership of the project, and to gain an effective voice in project management by purchasing investments. Foreign direct investment was associated with the emergence and development of international trade, and its spread and growth rate contributed to the emergence of multinational companies and mergers and acquisitions, including the purchase of government agencies by foreign investors. Which has been privatized, and most countries use foreign capital to invest in foreign trade, modernize production facilities and develop links between foreign direct investment and foreign trade. This diligence arises from the different nature of trade in which multinational corporations are

located; Because trade usually takes place on separate sides and in different directions across international borders; Because they trade with each other in perfect markets, operating according to a rational distribution of resources.

**3- The third variable: the patent:** the patent is defined as a certificate or document granted by the state to inventors to describe and define the inventions, put descriptions of the inventions, and grant legal protection to the inventors. Accordingly, he has the right to monopolize the exploitation of the materials he invented for a certain period of time and under certain conditions Linked to innovation and growth via its impact on income, one option for exporting firms is to base their business decisions in part on the domestic patent protection system. that stronger patent protection had a positive, albeit small, effect on imports of manufactured goods in developing countries. This effect is more evident in large developing countries with traditional capabilities. The new developments in global trade, the most prominent of which is the increasing importance of services and information, along with the decline in the importance of raw materials, has led to reliance on patents more than others in the production of goods and services. A report issued by the Council on Foreign Relations indicated that the industries that depend on intellectual property are distinguished because they can be exported, which is at the forefront of international trade.

**4- The fourth variable is human development:** The concept of human development is one of the contemporary vocabulary that spread at the end of the twentieth century. It is intended to expand the options for individuals and provide the best requirements for human well-being. Human development is defined as the best use of available economic resources in the country in a way that guarantees the continuity of economic growth in it. The elements of human development or its indicators have received great care from those working in the field of planning in order to reach standards and indicators that can be used in the fields of development in the countries of the world, whether developed or developing ones, through which the differences between these countries can be identified in all aspects of life.

### III. DATA AND METHODOLOGY

The data of the study sample, represented by the independent and dependent variables in the study form, were collected through time series data. The sources of this data are many official governmental and non-governmental websites, including World Bank Data and International Monetary Fund publications that have been relied on and used in Study form. The econometric model, in its general form, is required to be evaluated and then analyzed for its results during the study period, and the model takes the following form:

$$Y = f(X_1, X_2, X_3, X_4) + ei$$

Since:

Y: the dependent variable represented by total trade relative to GDP.

X1: The first independent variable is represented by economic globalization.

X2: The second independent variable is a foreign direct investment in the gross domestic product.

X3: The third independent variable represented by patents registered to residents

X4: The fourth independent variable representing human development.

ei: The random variable, which includes all variables that are not shown in the model or that were not taken into account in the model, which, if used, would affect the model (international trade).

#### Unit root test:

It is considered one of the most common tests to determine the stability or instability of time series of economic variables by applying the statistical method of this test to understand the number of differences required to study the series, which in turn is more than the traditional method, if we have variables (Yt), the relationship is as follows:

$$Y_t = BY_{t-1} + ut$$

We see one of the OLS assumptions, the random error ut, called the white noise error term in the equation, in which we see how the unit root is used. This is a pass (B). If its value equals the correct value (B = 1), then the economic variable Yt has a unit root and is an unstable variable. This situation is called the random walk-to-error equation. This is the basic idea in the unit root test, like the test by (B) we see if it is equal to one or less than one (Tsay, 2012), and the unit root test includes the following assumptions:

Null hypothesis or null hypothesis (: H1 or  $\sigma = 0$ ) = B, which means that it is equal to zero and B is equal to one. Therefore, the null hypothesis means that the time series has a unit root and is therefore an unstable sequence.

The alternative hypothesis is  $B < 1$ : H1 or  $B < 0$ , which means that B is a negative number less than zero and B is less than one. Therefore, the alternative hypothesis states that the string has no unit root and that it is a stable string. The unit root is tested by several tests, including, and in our research we chose the Phillips-Peron test.

#### Phillips-Perron Test (PP):

The Phelps-Perron test was used in (1988), and it differs from the extended Dickie-Fuller test in that it does not include the late values of the difference. It is more accurate and has broader power in the statistical test, especially regarding sample size in fewer cases. Compared to the ADF test with standard methods, many statisticians believe that the PP test is better and more accurate than the ADF test, and the results of the PP test are better in reliability (Al-Sheikha, 2015, 77).

**Cointegration methodology using ARDL autoregressive distributed time lag model:**

In this study, we will use a modern approach which is the ARDL approach developed by Pesaran (1997) (1998) and 2001 Shinand and Sun. The advantage of this test is that it does not require the same degree of integration as the time series. Pesaran believes that regardless of the properties of the time series and whether they are stable, the limit test in the ARDL framework can be applied in I(0) or I(1) first-order synthesis or a combination of the two. The only condition for applying this test is that the time series does not integrate to a degree (2) I. The Pesaran method performs better than other commonly used cointegration tests methods, such as the two-stage method, DW test or Johansen test for cointegration in the case of short time series, under the VAR model. The ARDL model requires a sufficient number of delay times to obtain an ideal data set and gives the best results for the long-term parameters.

Moreover, we can separate the short-term and long-term effects because, in this way, the dependent and independent variables The combined long-term and short-term relationships of the variables in the same equation. To test the extent to which cointegration relationships between variables are achieved within the framework of UECM models, Rasan et al. 2001) A method for testing the degree of achieving balanced relationships between variables under the parametric error-corrected model. This approach is known as the limits testing approach. Any testing method is limited (Adriush et al., 2016). The ARDL model test first includes testing whether there is a long-run equilibrium relationship between the model's variables. If we confirm the existence of such a relationship, we proceed to estimate the long-run and short-run parameters of the independent variables. To this end, we compute the F statistic utilizing the Wald test, which tests the null hypothesis that there is no cointegration relationship between the model variables (there is no long-run equilibrium relationship, i.e., in contrast to the alternative hypothesis, which indicates that there is a long-run cointegration Between the levels of the model variables after Wald test, we compared the statistic (F) with the tabular values developed by Perasan et al. (2001).In these tables (1-2-3), the upper and lower critical values can be found at the significant limits of

the cointegration possibility test. Among the variables of the study, Perasan et al. The first difference between them is (1) I, and the integration variable is (0) level I, or they are at the same degree of integration. Suppose the calculated value (F) exceeds the proposed upper critical value. In that case, we reject the hypothesis that there is no long-term equilibrium relationship, that is, a study of an alternative hypothesis, as there is a cointegration relationship between the variables. Still, if the calculated value is less than the minimum value of the critical value, then we accept the assumption of equilibrium relationships that are absent in the long run (Faryal, 2018).

**Vector Error Correction Model (VECM):**

This method differs from the Engel-Cranger model in that it separates long-term relationships from short-term relationships, and the estimated parameters are used in this model more than other methods such as Johansen and Engel-Cranger methods. Whether it is a short-term or long-term relationship, or a dynamic relationship between economic variables, unless Johansen chooses to apply the model after successful cointegration. The vector error correction model is the autoregressive model, which is a special case of the autoregressive model. Stable time series model (Tabal et al., 2014).

**IV. EVALUATE PROCEDURES AND RESULTS**

Estimating the impact of the digital economy on international trade, Egypt as a model.

**Unit root test:** To ensure the stability of the time series and its absence from the unit root, the Phillips-Peyron test (PP) was used, and the results were as follows. As it was clear from the results of the unit root test for the dependent variable and the independent variables, and it was found that the variables are static in the first difference in each of the tests ((Unit Root Test Table (PP)) and that they are stable at the first difference, whether in the presence of a categorical (With Constant) or a categorical and a general direction (With Constant & Trend) and this is based on a Prob value less than (5%) that indicates the static of the variables, and this indicates the possibility of applying the ARDL model.

**Table 1: The results of the unit root test - Phillips Peron for the variables of the study. The impact of the digital economy on international trade in Egypt for the period (1990-2020)**

UNIT ROOT TEST TABLE (PP)						
Null Hypothes is: the variable has a unit root At Level						
		Y	X1	X2	X3	X4
With Constant	t-Statistic	-1.4149	-2.0283	-2.1383	-0.3934	1.1664
	Prob.	<b>0.5617</b>	<b>0.2738</b>	<b>0.2320</b>	<b>0.8981</b>	<b>0.9971</b>
		n0	n0	n0	n0	n0

With Constant & Trend	t-Statistic	-1.8924	-2.3634	-2.1256	-1.8579	-5.8755
	Prob.	<b>0.6335</b>	<b>0.3898</b>	<b>0.5115</b>	<b>0.6509</b>	<b>0.0002</b>
		n0	n0	n0	n0	***
Without Constant & Trend	t-Statistic	-0.8313	-0.0103	-1.4867	1.9757	9.4857
	Prob.	<b>0.3474</b>	<b>0.6714</b>	<b>0.1259</b>	<b>0.9864</b>	<b>1.0000</b>
		n0	n0	n0	n0	n0
At First Difference						
		d(Y)	d(X1)	d(X2)	d(X3)	d(X4)
With Constant	t-Statistic	-4.2304	-4.6580	-3.2019	-6.2476	-17.6617
	Prob.	<b>0.0026</b>	<b>0.0009</b>	<b>0.0301</b>	<b>0.0000</b>	<b>0.0001</b>
		***	***	**	***	***
With Constant & Trend	t-Statistic	-4.1546	-4.5103	-3.1435	-6.3228	-16.5526
	Prob.	<b>0.0143</b>	<b>0.0063</b>	<b>0.1156</b>	<b>0.0001</b>	<b>0.0000</b>
		**	***	n0	***	***
Without Constant & Trend	t-Statistic	-4.2192	-4.7475	-3.2802	-5.6727	-5.2518
	Prob.	<b>0.0001</b>	<b>0.0000</b>	<b>0.0019</b>	<b>0.0000</b>	<b>0.0000</b>
		***	***	***	***	***
Notes:(*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% and (no) Not Significant.						

Source: Prepared by the researcher based on the statistical program (EViews.10).

Based on the results of the above test related to the unit root of the study variables, it becomes clear to us the following:

The time series of the variable (X4) is stable at the level at a constant and trend at a significant level (5%).

The rest of the series variables (Y, X1, X2, X3) are unstable at the level, and after taking the first

difference, they are stable in the presence of a constant, constant, trend, without a constant, and a general trend at a significant level (1%).

**Results of testing the ARDL autoregressive model in Egypt:**

After we tested the rest of the time series, the following Table shows the results of the ARDL test:

**Table 2: Results of applying the ARDL model to study variables. The impact of the digital economy on international trade in Egypt for the period (1990-2020)**

Dependent Variable: (Y)				
Method: ARDL				
Sample (adjusted): 1993 2020				
Included observations: 28 after adjustments				
Maximum dependent lags: 5 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lag, automatic): (X1) (X2) (X3) (X4)				
Number of models evaluated: 405				
Selected Model: ARDL(3,2,2,2,2)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	0.140171	0.310381	0.451610	0.6603
X1	0.851673	0.324310	2.626105	0.0236
X2	-0.222677	1.185287	-0.187868	0.8544
X3	-0.025653	0.012125	-2.115651	0.580
X4	-386.4789	172.9489	-2.234643	0.471
C	437.1918	182.2627	2.398691	0.0353
R-squared	0.944			

Adjusted R- squared	0.864
F-statistic	11.8067
Prob(F-statistic)	0.0001
Durbin-Waston stat	2.496
<i>Source:</i> Prepared by the researcher based on the statistical program (EViews.10).	
<i>Note:</i> p-values and any subsequent tests do not account for model selection.	

From table (2) it is clear that the ARDL model determines the degrees of time delays for the variables included in the model. As for the test results of the explanatory power of the model expressed by the coefficient of determination R<sup>2</sup>, it has been shown that the independent variables (economic globalization, foreign direct investment, patents, human development) It explained (94.49% of the change in the dependent variable (international trade in relation to GDP) and that there is (5.51%) due to factors outside the model that can affect the dependent variable, while the (F) test, which means the overall significance of the model, reached Likelihood ratio (0.0001), which indicates the quality of the model at a significant level (1%).

Fifth: Cointegration Test Table (3) shows the Bound Test Approach, which is used to reveal the cointegration relationships between the model variables in Iraq. As we note from the test results that the calculated (F) value was (5.307), which is greater than the tabular (F) value at the lower and upper limits at a significant level (5%), and this indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis; Which stipulates the existence of cointegration relations (a long-term relationship between the variables of the dependent variable model and the independent variables) in Egypt.

**Table 3: Cointegration test for study variables. The impact of the digital economy on international trade in Egypt for the period (1990-2020)**

(Bound Test Approach)				
Test Stat	Value	Sign.	I(0)	I(1)
F-stat	5.307	%10	3.03	4.06
K	4	%5	3.47	4.57
		%2.5	3.89	5.07
		%1	4.4	5.72

*Source:* Prepared by the researcher based on the statistical program (EViews.10).

**The results of the test parameters estimated for the short and long-term relationship of Egypt variables**

Through this test, we can estimate the parameters in the short and long term and indicate the

effect of the independent variables on the dependent variable, as in the following Table:

**Table 4: Results of applying the short and long term relationship of the study variables. The impact of the digital economy on international trade in Egypt for the period (1990-2020)**

Dependent Variable: d(Y)				
Method: ARDL				
Sample : 1990 2020				
Included observations: 28				
Case 5 : Unrestricted Constant and Unrestricted Trend				
Selected Model: ARDL(3,2,2,2,2)				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y-1)	0.366100	0.210946	1.735515	0.1105
D(X1)	0.851673	0.324310	2.626105	0.0236
D(X2)	-0.222677	1.185287	-0.187868	0.8544
D(X3)	-0.025653	0.012125	-2.115651	0.0580

D(X4)	-386.4789	172.9489	-2.234643	0.471
TREND @	5.173453	2.127453	2.431760	0.333
C	437.1918	182.2627	2.398691	0.0353
*p-value incompatible with t-Bounds distribution. ** Variable interpreted as $Z = Z(-1)+D(Z)$ .				
Levels Equation Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.468035	0.280060	1.671200	0.1229
X2	1.110827	0.785471	1.414217	0.1850
X3	-0.041686	0.013228	-3.151322	0.0092
X4	-592.1372	210.5000	-2.813003	0.169
EC=Y-(0.4680*X1 + 1.1108*X2 -0.0417*X3 -592.1372*X4)				

Source: Prepared by the researcher based on the statistical program (EViews.10).

**A. Short-term relationship:** Use the error correction coefficient test that predicts the return of the model to the equilibrium state, and measures the speed of return in the long term between the independent variables and the dependent variable included in the model. From the results of Table (4), we have the following:

**Economic globalization:** It directly and significantly affects international trade. This means that an increase in economic globalization by (1%) leads to an increase in international trade by (0.85%) at a significant level of (5%), which is identical to economic theory.

- Foreign Direct Investment: It has an adverse and insignificant effect on international trade. This means that an increase in foreign direct investment by (1%) leads to a decrease in international trade by (-0.22%), but it is not significant at the level of (5%). The reason is due to administrative obstacles represented in the lengthy administrative procedures related to investments, which leads to the investor's lack of confidence in investing in Egypt (Othman, 2021), in addition to the political and security obstacles in Egypt. Instability led to the decline of foreign direct investment (Abdul Hamid, 2017). Also, tax exemptions affect the state budget since taxes are the main component of the Egyptian economy, in addition to the fact that some investments affect the environment through air and water pollution and desertification of agricultural lands and are considered a cost to the state in dealing with them (Sayed et al., 2022).

- Patents: have an adverse and significant effect on international trade. This means that an increase in patents by (1%) leads to a decrease in international trade by (-0.02%), which is significant at the level of (10%). Perhaps the reason is due to the low government expenditures for patents in Egypt, in addition to the lack of financial incentives or grants provided by the government to inventors and developers except for some private, non-governmental institutions and the main reason may be due to the weak protection of the intellectual property rights of the Egyptian inventor, as

Egypt is classified. It ranks late in the international classification for the protection of intellectual rights, ranking (110) globally, according to the Global Competitiveness Report (ALSCO, 2017).

- Human development: It adversely and significantly affects international trade. This means that an increase in human development by (1%) leads to a decrease in international trade by (-386.47%) at a significant level of (5%). Perhaps the reason for this is the absence of plans and strategies. Government in the development of human development due to the high cost of development and the weak accumulation of expertise led to a decline in development indicators, especially higher Education in the field of technology and information, and weak cooperation between governmental and industrial educational institutions (ALSCO, 2017).

**B- Long-term relationship:** The test reveals the type of relationship between the independent variables and the dependent variable and the degree of influence between them. From the Table, the following is clear:

Economic globalization: directly and insignificantly affects international trade. This means that an increase in economic globalization by (1%) leads to an increase in international trade by (0.46%). Still, it is not significant at the level of (5%), which is identical to economic theory.

Foreign direct investment: directly and insignificantly affects international trade. This means that an increase in foreign direct investment by (1%) increases international trade by (1.11%). Still, it is not significant at the level of (5%), which is identical to economic theory.

- Patents: have an adverse and significant effect on international trade. This means that an increase in patents by (1%) leads to a decrease in international trade by (-0.041%), which is significant at the level of (1%). Perhaps the reason is that government expenditures are low for patents in Egypt, in addition to the absence of financial incentives or grants the government provides to inventors and developers, except for some private non-

governmental institutions. The main reason may be due to the weak protection of the intellectual property rights of the Egyptian inventor; As Egypt is ranked late in the international classification for the protection of intellectual rights, it is ranked (110) globally, according to the Global Competitiveness Report (ALSCO, 2017).

- Human development: It negatively and significantly affects international trade. This means that an increase in human development by (1%) leads to a decrease in international trade by (-592.13%) at a significant level of (5%). Perhaps this is due to the absence of plans and strategies. government in the development of human development due to the high cost of development, and the weak accumulation of expertise led to a decline in development indicators, especially higher Education in the field of technology and information, and weak

cooperation between governmental and industrial educational institutions (ALSCO, 2017)

**Error correction coefficient (ECM) test for Egypt**

Cointegration of economic variables provides a statistical basis for the use of error models. The main reason for the frequent use of error correction models is the result of short-run fluctuations in the digital economy and indicators of international trade relative to GDP, which leads to deviations from long-run equilibrium relationships. The error correction coefficient (ECM), also known as the cointegration coefficient, indicates that in each period a certain proportion of the imbalance in the digital economy is adjusted so that the long-run relationship with international trade indices tends to balance out.

**Table 5: The results of the error correction model (ECM) for the long-term relationship between indicators of the digital economy and international trade for the State of Egypt for the period (1990-2020)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Eq(-1)*	-1.225929	0.203800	-6.015340	0.0001

Source: Prepared by the researcher based on the statistical program (EViews.10).

The results of Table No. (5) confirm the existence of a long-term cointegration relationship between the variables of the model, that is, there is a long-term equilibrium relationship between the indicators of the digital economy and international trade. The error correction limit or the cointegration coefficient appears with a negative and significant value at (1%) and its value is estimated at (-1.225929) approximately, and it indicates the amount of change in international trade as a result of the deviation of each of economic globalization, foreign direct investment, patents, and human development. In the short term, it differs from its equilibrium values in the long term by one unit each, meaning that international trade will take approximately one year to return to its equilibrium value in the long term after the effects of shocks in the indicators of the digital economy, because  $1/1.225929 = 0.89 \cong 0.9$  year

**V. CONCLUSIONS**

**The theoretical side:**

Digital transformation is essential. Because it plays a distinct role in improving services and implementing activities electronically, thus increasing accuracy and quality, which helps increase trade exchange between countries, gaining ample time, disseminating information and coordinating with different departments.

The digital economy is presently contributing to national production and distribution to economic institutions, which increases the gross domestic product and thus increases their profits, which affects the increase in their exports, as the digital economy is one of

the distinguished sectors along with other economic sectors, as it represents a certain percentage of GDP revenues, albeit at a lower level than in Arab countries.

The digital economy is one of the modern means of local and international economic interaction. It removes traditional barriers to economic activity that relied heavily on information and communication technologies based on speed and availability.

Arab countries seek to improve the basic axes on which the digital economy is based, in terms of strategic dimensions such as the foundations of the digital economy that will help them advance and prove their level of performance in this field compared to developed countries and then keep pace with modern international trade in the developed world.

The weakness of the infrastructure of the information and communication technology sector, as well as the low rate of spending on research and development projects, has caused a large gap between the Arab countries and the developed countries, which is greatly reflected in international trade, and this is evident in the domination of the developed countries in all aspects of the global economy.

The digital economy is a new method for doing business and economic activities by using digital technology represented by the global network of communications and information (the Internet), computer technologies and smart phones, for the purpose of increasing and improving growth by developing all economic sectors, agricultural, industrial, commercial, financial and service, as well as the production of intangible digital goods. Such as software using digital and computer technological means and methods.

## STANDARD SIDE

### *Second: Egypt:*

1- The results of the State of Algeria showed that economic globalization directly and significantly affects international trade in the short and long terms, and then an increase in international trade.

2- Foreign direct investment was negative and insignificant in international trade in the short term, and this means that an increase in foreign direct investment by (1%) leads to a decrease in international trade by (-0.22%). The reason is due to the existence of administrative obstacles represented in the length of administrative procedures related to investments, which leads to the investor's lack of confidence in investing in Egypt, as well as the political and security obstacles that occurred in Egypt and instability led to the decline of direct foreign investment. This means that an increase in foreign direct investment by (1%) leads to an increase in international trade by (1.11%), but it is not significant at the level of (5%).

3- Patents: have an adverse and significant effect on international trade in the short and long terms. This means that an increase in patents by (1%) leads to a decrease in international trade by (-0.02%) and significant at the level of (10%). The reason is that the government expenditures are few for patents in Egypt before the Egyptian government, as well as to the absence of financial incentives or grants provided by the government to inventors and developers except from some private non-governmental institutions.

4- Human development: It adversely and significantly affects international trade in the short and long term, and the reason for this is due to the absence of governmental plans and strategies in developing human development due to the high cost of development, and the weak accumulation of expertise has led to a decline in development indicators, especially higher Education in the field of technology and information. Weak cooperation between governmental and industrial educational institutions.

## RECOMMENDATIONS

1. Legislation must be enacted to ensure the safety and rights of electronic traders in the field of information technology, and to encourage scientific research and innovation in the field of information technology and digital technology.

2. There is a need to enhance the digital skills of individuals or companies so that they can adapt to the digital revolution and the development of modern technologies.

3. The need to take care of the digital economy as one of the sectors that work to increase the country's gross domestic product. Because it is highly expected in the future to have a fundamental role in all aspects of life.

4. Seizing new opportunities related to digital commerce and e-commerce by adapting trade policies to meet new challenges whose solutions are limited to data flows, electronic payments and interoperability, and to promote regional integration in the Arab world

5. Providing the necessary infrastructure for trained and highly skilled individuals, because they are a real revolution that will be reflected in international trade in light of globalization, the digital economy, and the rapid development in the fields of technology and information.

6. Attracting foreign direct investment to the Arab countries, especially in the field of technology and information, because of its positive role in the economy. Strengthening the infrastructure of the Arab countries, as countries seek to keep pace with the development taking place in the world, but the policies and procedures of foreign direct investment lead to hindering and attracting the foreign investor.

7. Arab countries should exchange professional knowledge and successful experiences with developed countries, enhance cooperation and coordination, avoid mistakes and learn from best practices in the field of digital economy, and absorb the contemporary digital revolution.

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