Journal of Financial, Accounting and Managerial Studies
ISSN 2352-9962/E-ISSN 2572-0147
Volume09 Number 02- December 2022

OEB Univ. Publish. Co.

The impact of the use of information and communication technology on the processes of foreign trade of the Algerian economy

أثر استخدام تكنولوجيا المعلومات والاتصالات على عمليات التجارة الخارجية لاقتصاد الجزائر

KADRI Nouria[1*]
REKRAK Mounia[2]
[1] University of Mascara -Algeria kadri.nouria@univ-mascara.dz
[2] University of Mascara -Algeria monia.rekrak@univ-mascara.dz

Date of receipt: 2021-04-04 Date of revision: 2021-06-04 Date of acceptation: 2022-04-05

Abstract

Information and communication technology has contributed to changing many aspects of the lives of individuals and modern societies and has created several new services such as e-commerce, which has achieved very high rates of growth and rapid spread in a short period in recent years.

The volume of e-commerce witnessed a remarkable development at the global level, and it also effectively contributed to the foreign trade sector.

Through this research and through the standard study on the impact of ICT indicators on foreign trade in Algeria, we concluded that the contribution of electronic commerce to foreign trade has not found its place yet and has not achieved the desired breakthrough so far.

Keywords: Foreign trade, information and communication technology, e-commerce.

Classification JEL: F14, F64, F69

ملخص

ساهمت تكنولوجيا المعلومات والاتصال في تغيير جوانب عديدة من حياة الأفراد والمجتمعات الحديثة وأوجدت عدة خدمات جديدة كالتجارة الإلكترونية التي حققت معدلات جد مرتفعة في نموها وسرعة انتشارها في فترة وجيزة خلال السنوات الأخيرة، كما ساهمت بشكل فعال في قطاع التجارة الخارجية. من خلال هذا البحث ومن خلال الدراسة القياسية عن مدي تأثير مؤشرات تكنولوجيا المعلومات والاتصالات على التجارة الخارجية في الجزائر استنتجنا ان مساهمة التجارة الالكترونية في التجارة الخارجية لم تجد مكانتها بعد ولم تحقق الانطلاقة المرجوة لحد الآن.

الكلمات المفتاحية: التجارة الخارجية، تكنولوجيا المعلومات والاتصال، التجارة الإلكترونية.

* Corresponding Author: KADRI Nouria, Email: knouria45@yahoo.fr

1- INTRODUCTION:

The world economy is going through a huge information revolution due to the endless development in information and communication technology, which translates the globalization and openness of trade and investment at the international level. Where the tremendous development in information and communication technology and the widespread use of the Internet led to the flow of information, ideas, knowledge, experiences and innovations across geographical borders and to the disappearance of distances between countries that represented an important obstacle to foreign trade operations. The Internet is often used as an alternative to physical channels to distribute exports and attract imports; exporters in all sectors have better opportunities to penetrate international markets without the need for direct physical presence that has been replaced by fixed mobile phones, e-mails and virtual conferences.

This development and rapid spread of information and communication technology since the mid-1990s and beginning of 2000s coincided with a significant increase in international flows of goods and services, and an increase in exports. Where scientific studies and research confirm that electronic commerce has become an urgent necessity for developing countries due to their increased contribution to global trade, as well as the development of their national productive sectors and the availability of increasing opportunities to raise their economic growth rates. It derived its strength from information and communication technology and the emergence of the Internet and the speed of its spread, thus facilitating a lot of foreign trade business, as it has become an electronic market in which economic dealers communicate from all over the world.

Algeria-like the rest of the world is striving to maximize the development of tablets and connectivity technology and accelerate the transition to them and by overcoming obstacles and obstacles facing their application and providing all causes of success, including technological infrastructure and legislation related to their application, which will have an adult on its foreign trade.

Through this presentation of our topic, the following problem becomes evident:

What is the impact of the use of information and communication technology on the foreign trade operations of the Algerian economy?

In order to achieve the objectives of the study and to be able to answer the questions posed, as well as address the problem of the study, the following hypotheses will be tested:

- **First hypothesis:** Algeria's exports are not affected by information and communication technology.
- **Second hypothesis:** Algeria's imports are not affected by information and communication technology.

This study seeks to achieve a set of goals that would clarify what distinguishes electronic commerce from the traditional method of commercial exchanges and the reasons for its great popularity among individuals and various institutions, in addition to its impact on foreign trade operations. Highlight the contribution of information and communication technology to foreign trade operations and the resulting impact.

The study adopted an approach suitable for this type of studies, as it relied on both the descriptive and analytical approach, in addition to our adoption of the standard analysis method when studying the impact of the ICT development index on the two processes of foreign trade, represented in exports and imports.

2- THEORETICAL FRAMEWORK OF THE STUDY:

Communication and information technology is the advanced technology that connects individuals, institutions and even peoples with no presence in the same place at the same time, and although some view this new technology as a kind of luxury, some of its manifestations have become an integral part of the daily life of citizens throughout the world.

The technical or technological development is not a purely technical development related to the machine, the means or the product only, but it plays an important and qualitative role in the economic, political and cultural developments of any society, and its impact includes all aspects of the life of societies. They are not just technological changes. Just as politics and economics affect technological choice, we also find that technology has political and economic consequences. New technological methods are manifestations of change and its factors.

According to the previous data, the information revolution is the expansion and unification of information networks and the establishment of global information networks, all of this led to placing the inventory of the achievements of the human mind and human experience in all aspects of life in the hands of individuals, institutions and groups, and contributed to the achievement of the mass of knowledge and its spread and facilitation of access to it, and the end of the covenant that It was the preserve of specialists and their wealth alone. The communication revolution, the technological media revolution and the information revolution have today become a reality that almost touches its effects and problems every day.

The economic and social development achieved in the global economies based on knowledge has contributed to the information and communication technology in a very large way, which prompts countries to search for ways that allow them to evaluate the efforts made in establishing the infrastructure of information and communication technology, considering that the latter is considered the most important means that enables the detection of information and communication technology. The strengths and weaknesses of countries' policies aimed at entering the knowledge economy. According to the United Nations and based on the study of the opinions of experts and specialists, it was possible to conclude that the ICT index should not depend on the strength of the information infrastructure, digital content, and the uses of individuals and government institutions only, but also depends on the same degree of importance on The general climate for development in the particular country, regarding the quality of pre-university, technical and higher education, the country's ability to research, development and innovation, the elements of the knowledge economy related to the legal environment, dispute resolution and intellectual property protection, the efficiency of company establishment and operation processes, and the ability to On competition as well as the drivers of development, from the impact of technology on products and services, the level of knowledge-intensive labor activities and the extent of electronic participation and health care (Mouloud, 2019, pp. 27-28).

The developments in the Internet were reflected in the patterns of international trade and international payments through what is known as electronic commerce. International trade is closely linked to technological developments with regard to the quality of commercial contracts and the modalities of their implementation. We find that electronic commerce has developed at great rates, recording a growth of more than four times in just four years between 2005 and 2009, from a total value of 3888 billion dollars to 16135.7 billion dollars, respectively.

Despite the lack of empirical studies in the field of researching the impact of electronic commerce on international trade, the results obtained demonstrate a clear impact of the latter on electronic commerce, through the volume of product prices and profits, as well as the volume of exports of goods...etc. Statistics indicate the growth of international e-commerce exports from $5712 billion to 12490 billion dollars, and the growth of global services trade exports from 1394.6 billion dollars to 3350.2 billion dollars between 1999-2009. (report, 2010)

And the new theory in foreign trade has the greatest impact, according to what it explained of the impact and economies of scale, as the economist

was concerned KRUGMAN 1990 studies many types of costs related to international trade, considering transportation costs as a major factor in international trade. If we talk about electronic commerce, we will be in a direct discussion of the transportation costs related to the existing trade deals, to represent an important turning point compared to other determinants such as customs cuts, income growth and convergence..etc. (Diab, 2010, p. 32)

The results of an empirical study on the bilateral flows of sixteen countries from the Organization for Economic Cooperation and Development during the period of late 1950 and late 1980 found that trade growth of 148 percentage points is explained by about 67%-69% of real GDP growth, 23%-26% of tariff cuts and preferential trade agreements and 8%-9% as a result of the decrease in transportation cost, while there is no effect of convergence between the exchange parties in GDP The real total, and hence, the transportation costs represent about one third of the relative contribution to trade liberalization for the OECD countries. The electronic dealing includes many fields, perhaps the most prominent of which are electronic management, electronic government, electronic marketing and electronic financial payments in addition to electronic commerce, the latter has become a feature Contemporary commercial transactions, especially in developed countries that have an infrastructure qualified to practice electronic commerce (Diab, 2010, p. 34).

From the above we conclude that e-commerce is an advanced form of commerce, and it includes all commercial activities and the conclusion of deals and contracts that take place between economic dealers, whether they are individuals, institutions or governments using information and communication technology via the international network "Internet" at the local and international levels.

E-commerce is characterized by several tools, including those related to the presentation of goods and services until delivery, including those related to after-sales services. (Mamdouh, first edition 2008, p. 17)

3- DESCRIPTIVE STUDY OF E-COMMERCE VARIABLES AND TRADE BALANCE INDICATORS FOR ALGERIA

3-1 ICT indicators in Algeria:

To study the impact of ICTs on trade balance of Algeria, the proportion of progress in the construction of the information society and the evaluation of the modern technologies sector and the volume of its contribution to exports and imports must be measured through a total of comparative indicators, which enable any State to determine any State on the international arena.

There are five main indicators: (Ibrahim, 2018, pp. 151-155)

3-1-1 Information and Communication Technology Development Index IDI It aims to monitor the progress recorded in the rates of development and growth of information and communication technology, determine the size of the digital gap between the countries of the world, as well as determine the development potential of digital technology and the extent to which countries are able to benefit from it to promote growth and development in the context of available capabilities and skills.

The Information and Communication Technology Development Index is divided into three sub-indicators:

A - Access to information and communication technology index Access Sub-Index: It is concerned with measuring the readiness of access to information and communication technology, and includes five basic indicators: fixed-line subscriptions, mobile phone subscriptions, international Internet bandwidth for each user, the number of households that have a computer, and the number of households that have access to the Internet.

B-Indicator of the intensity of the use of information and communication technology Use Sub-Index: It is concerned with measuring the intensity of the use of information and communication technology, and it consists of three sub-indicators, namely: individuals who use the Internet, subscriptions to fixed broadband, and subscriptions to mobile broadband.

C- ICT skills index Skills Sub-Index: It is concerned with measuring the degree to which individuals comprehend the capabilities and skills important for the use of information and communication technology, and includes three sub-indicators, namely: average years of study, total enrollment for the final stage, and total enrollment in higher education.

According to the annual report for the year 2019 issued by the Algerian Postal and Electronic Communications Control Authority, we present some statistics that may somewhat enable us to measure the indicator of the development of information and communication technology IDI".

Table No.02: Comparison of average values IDI for Algeria with Africa and all countries of the world

global rank	**IDI 2017**				**IDI 2016**				**number of countries**	**Region**
	IDI	**skills**	**Use**	**force**	**IDI**	**skills**	**Use**	**force**		
106	4.67	6.29	3.38	5.14	4.32	6.10	2.92	4.83	/	**Algeria**
	2.64	3.16	1.74	3.28	2.48	3.07	1.48	3.18	38	**Africa**

	5.11	5.85	5.59	5.59	4.93	5.75	3.95	5.49	176	**world**

global rank	**IDI 2019**				**IDI 2018**				**number of countries**	**Region**
	IDI	**skills**	**Use**	**force**	**IDI**	**skills**	**Use**	**force**		
102	4.92	6.23	3.68	5.38	4.71	6.36	3.18	5.12	/	**Algeria**
	3.17	3.61	2.14	3.51	3.14	3.69	2.26	3.37	38	**Africa**
	5.17	6.02	5.83	5.87	5.08	5.96	5.81	5.76	176	**world**

Source : (ncsi, 2021)

It is evident through the analysis of the table data, which was prepared based on the acquired statistics from the website https://ncsi.ega.ee/countryThe indicator of the development of information and communication technology IDI" has been developing over the past four years, as the index rose from 4.32 in 2016 to 4.92 in 2019, in addition to being high compared to the average level for African countries, but despite that it is still far from the required level, as it is less than The average global level is 5.17. Although Algeria was ranked by the International Telecommunication Union in the first rank in the Arab world and 22 globally in terms of the dynamic development of the ICT index, and ranked 106 between 2016-2017 and then moved to rank 102 during the years 2018-2019 This change is confirmed by the Information and Communication Technology Development Index (IDI).

3-1-2 Internet usage indicator: Refers to the percentage of people using the Internet out of the total population.

Table No.03: The evolution of the use of the Internet in Algeria compared to all countries of the world

Internet penetration rate (%)	The number of internet users	The proportion of the world's population (%)	population	Region	
13.6	4 700 000	0.44	34 586 184	Algeria	year2010
37.32	2 584 022 174	100	6 922 651 338	All countries of the world	
17.2	6 669 927	0.53	38 813 722	Algeria	year2014
42.58	3 089 307 634	100	7 254 527 674	All countries of the world	
5.2	18 580 000	0.54	41 063 753	Algeria	year2017

51.7	3 885 567 619	100	7 519 028 970	All countries of the world	
57	24 428 159	0.57	44 616 624	Algeria	year2020
76.06	5 895 018 958	100	7 750 365 586	All countries of the world	

(worldbank, 2021)

Through our analysis of the data in the table and based on the statistics obtained from the website https://worldbank.org/indicator, and publications of the International Telecommunication UnionIt is clear that the indicator of the use of the Internet has evolved during the years from 2010 to 2020, as a result of the efforts made to provide a stimulating environment that allows access to the Internet at the level of common spaces such as youth houses, culture houses, public reading institutions, mosques, where the Ministry of Post has adopted The information and communication technology is a sectoral plan based on concerted efforts and the exchange of resources. The coordination and consultation process initiated by the Ministry with four other ministries represented in the Ministry of Culture, the Ministry of Youth and Sports, the Ministry of National Solidarity, Family and Women's Issues, and the Ministry of Religious Affairs and Endowments allowed the connection of more than two thousand institutions to the Internet. For the benefit of citizens as a first stage, it also worked with the Ministry of National Education to connect primary schools to the Internet.

3-1-3 Network Readiness Index: This indicator was issued by the World Economic Forum, and it measures the extent to which the economies of countries are able to take advantage of information and communication technologies in order to increase competitiveness and prosperity. This indicator is based on a set of data issued by the International Telecommunication Union, the World Bank, the United Nations Educational, Scientific and Cultural Organization for UNESCO and other organizations, the index consists of four main axes, namely:

A-Environment Index: It includes two sub-indicators: the legislative and regulatory environment index, and the business environment and innovation index.

b- Readiness Indicator: It includes the Infrastructure Index, Cost Suitability Index, and Skills Readiness Index.

C- Indication of use: It consists of three sub-indicators: the individual employment index, the business sector employment index, and the government employment index.

D-Impact Index: It includes both the Technology Economic Impact Index and the Technology Social Impact Index.

It is clear from the table that Algeria occupies very late ranks with regard to the network or electronic readiness index, ranging between 117/139 and 131/144 globally during the period from 2012 to 2016. The only improvement recorded during this period was the year 2016. Compared to other years, which is a very slight improvement, Algeria ranked 117/139 in the networked readiness index, compared to rank 131 in the environment index, rank 95 in the readiness index, rank 125 in the employment index, and rank 129 in the impact index, as the bottom of Algeria's ranking is caused by The significant delay in the enactment of laws and legislation framing modern technologies for information and communication, and the severe shortage in the indicator of the use of information and communication technology in business at the rank of 133/147, in addition to the sharp decline in the indicators of the economic impact of technology and the social impact of technology, which scored 124/139, and 132/139 Straight.

Table No.04 : The Evolution of the Networked Readiness Index for Algeria according to the World Economic Forum

Sub-indicators	2012		2013		2014		2015		2016	
	Value (1-7)	Order (142)	Value (1-7)	Order (144)	Value (1-7)	Order (148)	Value (1-7)	Order (143)	Value (1-7)	Order (139)
Legislative and regulatory environment	2.7	132	2.5	141	2.6	140	2.9	127	3.0	123
Business environment and innovation	3.0	127	2.7	143	2.9	145	3.1	136	3.2	133
Environment Index	2.8	136	2.6	143	2.8	143	3.0	134	3.1	131
Infrastructure	3.1	105	2.6	119	2.4	127	3.7	83	3.9	80
Cost-effectiveness	5.5	51	5.3	64	6.0	42	4.5	94	4.4	99
Skills readiness	4.4	97	4.0	96	4.1	101	4.2	97	4.3	95
Readiness Indicator	4.3	88	4.0	96	4.1	101	4.2	97	4.3	95
Individual use	2.7	89	2.5	100	2.5	104	2.7	102	2.8	103
Employment in the business sector	2.6	140	2.1	144	2.5	147	2.7	137	2.9	133
Government use	2.8	135	2.7	139	3.0	134	2.7	134	2.7	130
Usage Indicator	2.7	127	2.4	140	2.7	134	2.7	129	2.8	125
The economic impact of technology	2.1	140	2.1	143	2.4	133	2.5	127	2.6	124
The social impact of technology	2.4	135	2.1	140	2.3	140	2.6	136	2.7	132
Impact indicator	2.2	140	2.1	142	2.4	137	2.5	134	2.6	129
Network readiness index	3.0	118	2.8	131	3.0	129	3.1	120	3.2	117

Source: (Ibrahim, 2018, p. 154)

We conclude from the above that despite the efforts made by Algeria in order to strengthen the infrastructure of information and communication technology, the global benchmarking indicators ranked it among the least prepared countries and the least connected to the electronic network.

3-1-4 Indicator of the percentage of households that own a computer: The concept of this indicator includes all families that have a computer available for use by all family members at any time, provided that it is considered a household asset, and the following table shows the percentage of families who have a computer in Algeria compared to the rest of the world.

Table No.05: Comparing families who have a computer in Algeria with Africa and the rest of the world

Percentage of households with a computer (%)				
year 2019	**year 2018**	**year 2017**	**number of countries**	**Region**
38.92	38.86	38.42	/	**Algeria**
9.78	9.74	9.60	38	**Africa**
47.98	47.36	46.61	176	**world**

source: (Ibrahim, 2018, p. 156), in addition to (International Telecommunication Union, 2019)

It is clear from the table that there is a large discrepancy in the statistical ratios of households that own a computer in Algeria compared to Africa and the rest of the world. The rest of the world, which reveals to us a digital chasm in the spread of computers between Algeria and the rest of the world, so the lack of awareness regarding the use of computers in Algeria is a major obstacle to the advancement of electronic commerce in it.

3-1-5 Indicator of the evolution of fixed and mobile subscriptions and their broadband: It consists of four sub-indicators, which are as follows:

- **Fixed telephone subscriptions index:** Refers to the sum of the effective number of fixed telephone lines, VoIP subscriptions, and fixed payphones.
- **Mobile phone subscription index:** Refers to the number of subscriptions to a mobile cellular telephone service that provides access to the PSTN" using cellular technology, and applies to all mobile cellular subscriptions providing voice communications, and excludes mobile radio services for private communications, paging and telemetry.
- **Fixed telephone subscriptions to fixed broadband internet:** Refers to high-speed Internet access "connecting a TCP/IP with down-to-dest speeds greater than or equal to"256 Kbit/S", in addition to the digital subscriber line and the fibers that are used in the framework of Internet acceleration.
- **Mobile broadband subscriptions:** Refers to the number of subscriptions to cellular telephone service networks that can access data communications such as the Internet at destination broadband speeds.

The following table also shows the evolution of fixed-line and mobile phone subscriptions and their broadband in Algeria compared to Africa and the rest of the world.

Table No.06: Comparing fixed and mobile subscriptions and their ranges in Algeria with Africa and the rest of the world

2017				Number of countries	Area
Mobile broadband per 100 inhabitants (kbit/s)	Fixed-line broadband per 100 inhabitants (kbit/s)	Mobile phone subscription per 100 residents	Fixed phone subscription per 100 inhabitants		
22.90	0.40	74.60	1.00	38	Africa
45.20	4.70	107.10	7.70	19	Arab States
47.40	11.30	98.90	10.00	34	Asia and the Pacific
59.70	15.80	141.20	20.70	10	Cis
80.10	30.20	118.00	37.70	40	Europe
82.70	19.10	114.20	24.40	35	Americas
52.23	12.39	101.53	13.57	176	**World**
46.81	6.92	117.02	8.24		**Algeria**

Source: (Ibrahim, 2018, p. 157)

It is clear from the table that although fixed-telephone subscriptions per 100 inhabitants in Algeria are "8.24" more than the average in African countries "1.00", they remain very weak when compared to the European level "37.7" and the global level "13.57", mainly due to the the lack of competition in the fixed phone sector in Algeria. As for the mobile phone, it is one of the most developed sectors, as it exceeded the level of the global average by "15.49." This is due to the intensity of competition in the mobile phone market between several institutions, which reflected positively on subscription prices and made them suitable for different segments society, as well as the diversity and multiplicity of the offers offered.

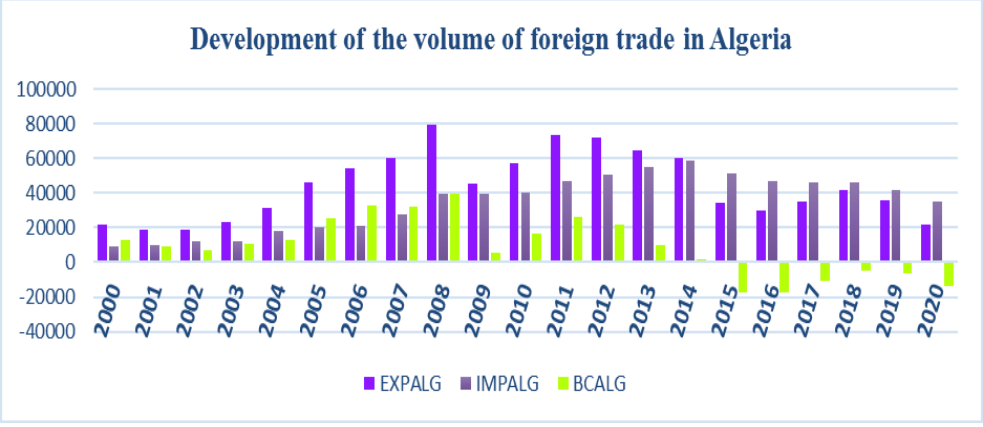
As for the fixed-line broadband index, it is higher than the average of African countries, but it remains very weak compared to the global average, and this is mainly due to the weak infrastructure of the fixed network and the high cost of investment in it, as well as the lack of competition in the

service, which negatively affected the quality of the service provided and its prices despite Fixed broadband is faster and better than mobile broadband.

As for the mobile broadband index, although it is higher than the average of African countries, it remains relatively weak compared to the global average, and Algeria hopes to raise its readiness to keep pace with the development of smart phone devices.

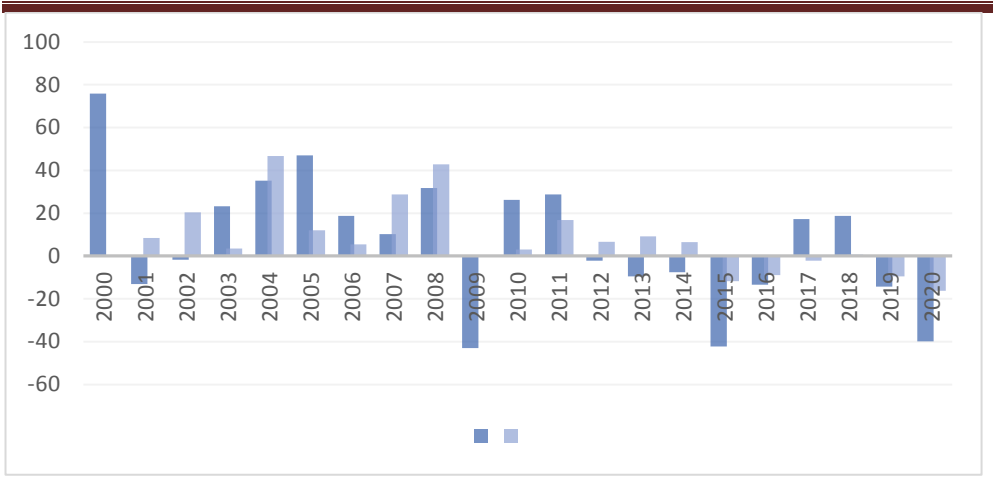
3-2 Indicators of foreign trade in Algeria:

Figure No.04: The evolution of the volume of foreign trade in Algeria during the period 2000-2020



Source : (worldbank, 2021)

Figure No.05: The evolution of the volume of foreign trade in Algeria during the period 2000 - 2020



Source : (worldbank, 2021)

It is clear from the analysis of the data of the figure on the development of the volume of trade exchange in Algeria and the development of the growth rate of foreign trade in Algeria for the period between 2000 and 2020, that the balance of trade balance is positive throughout the period from 2000 to 2014, when this period witnessed a growth in the value of imports and an increase In the proceeds of exports, where imports were completely covered by exports, the increase in export earnings is mainly due to the rise in oil prices and the increase in global demand for energy, as well as the commodity focus of Algerian exports on hydrocarbons by 97 percent.In light of the marginal outcome of exports outside hydrocarbons, with its decline during the following years, where it decreased in 2009 and 2010, and the reason for this is due to the effects of the financial crisis of 2008 and the global economic recession. It also reached its lowest value in 2016, and during the years 2015 and 2016 a negative balance was achieved Trade due to the decline in the value of exports due to the deterioration of oil prices in the global market and in return the increase in the value of imports. Algeria has also resorted to a policy of curbing or rationalizing imports through a set of measures represented in the roofing of many imports through the establishment of an import licensing system, in addition to obligating all car dealerships By investing locally and withdrawing the license in the event that this condition is not met, and therefore the balance of the Algerian trade balance is affected by changes in oil prices, and this requires more work to diversify exports outside the scope of hydrocarbons, whose features have emerged through the entry into the world E-commerce has expanded its scope at the local level, as a contribution to increasing the GDP, but it has not yet reached the required level, according to the results of

the United Nations Conference on Trade and Development (UNCTAD) and the Information and Communication Technology Development Index (IDI).

4- ECONOMITRIC STUDY OF E-COMMERCE VARIABLES AND TRADE BALANCE INDICATORS FOR ALGERIA

We try, through this study, to drop what has been discussed in the theoretical aspect, through the econometric study of the impact or role of information and communication technologies as an indicator of e-commerce on Algeria's foreign trade during the period "2007-2018", and this is according to the data available for the two variables in the same period.

4-1- Model and study variables: We formulate two models that represent the impact of the development of information and communication technology on Algerian exports and imports, within the limits of the available data, which were addressed in the descriptive study, and in order to avoid the heterogeneity of the variables and the absence of a relationship between them.

So: **ln**expal=**f**(lnIDI), including: **Ln**impalg = f(lnIDI),where it represents:

Lnexpal: The Niberian logarithm of Algeria's exports during the period "2007-2018".

Lnimpalg: The Niberian logarithm of Algeria's imports during the period "2007-2018".

lnIDI: The Niberian logarithm of the index of the development of information and communication technology in Algeria during the period "2007-2018".

After we formulate the models, we begin to study their variables, through a study their stability was done by using the unit root test for time series, then we used the developed Dickey Fuller test ADF" which will enable us to detect the stability of time series and determine their rank, as the stable time series is the one that does not contain a general trend nor seasonal fluctuations, but the historical events of economic facts rarely achieve random paths.

4-2- Time series stability test: To avoid falling into wrong analyzes, the time series stability test must be studied as a condition of joint integration, where unit roots are the most important way to determine the stability of the time series, so we will test the unit root based on the Dickey Fuller test The extender.

Concerning the Rising Dickie Fuller Test ADF, we have followed the following methodology:

Series (IDI):

[M1] $$\Delta IDI_t = \lambda IDI_{t-1} - \sum_{j=1}^{p} \phi_{j+1}\ \Delta IDI_{t-j} + c + bt + \varepsilon_i$$

[M2] $$\Delta IDI_t = \lambda IDI_{t-1} - \sum_{j-1}^{p} \phi_{j+1} + c + \varepsilon_i$$

[M3] $$\Delta IDI_t = \lambda IDI_{t-1} - \sum_{j-1}^{p} \phi_{j+1} + \varepsilon_i$$

We determined the degree of delay based on the three criteria Schwarz, AKaike , Los-Like lihood **,**With our pick of the smallest deceleration, which was mostly zero, Lag = 0**.**

To estimate the model, we chose the following hypotheses for most of the series:

Table N 09:test results"ADF" for "LNIDI" series

a test ADF for the series LNIDI, number of delays: minimum value = 0					
		H_0 :C=0	H_0 : b = 0	H_0 :λ=0	**models**
unstable chain	The result	(Prob)	(Prob)	(Prob)	
	Unstable	0.0158	0.0235	0.1967	[M1]
	Unstable	0.1826	/	0.7479	[M2]
	Unstable	/	/	0.9694	[M3]

Source: Prepared by researchers based on the program **10 reviews**

We note from the table that according to the model[M1]:The series LNIDI Unstable at the level, so we will test the stability of the chain after the first difference:

Table N 10:test results "ADF" for the "LNIDI" series after the first differences

a test ADF for the series LNIDI, number of delays: less value= 0					
		H_0 :C=0	H_0 : b = 0	H_0 :λ=0	**models**
stable chain	The result	(Prob)	(Prob)	(Prob)	
	Unstable	0.5509	0.8911	0.1619	[M1]
	stable	0.1352	/	0.0427	[M2]
	stable	/	/	0.0142	[M3]

Source: Prepared by researchers based on the program10 Views

We note from the table that according to the model[M2], the series lnIDI stable at the level.Through the tables, we note that the series lnIDI does not contain the general direction vehicle so they are two chains of type DS.

The series LNEXPALG unstable at the level, as per model[M1]

Table N 12: Test results ADF" for the series "LNEXPALG after the first differences

A test ADF for the series LNEXPALG, number of delays: minimum value = 0

		H_0 :C=0	H_0 : b = 0	H_0 :λ=0	**models**
stable chain	The result	(Prob)	(Prob)	(Prob)	
	Unstable	0.5664	0.7350	0.1568	[M1]
	Unstable	0.4887	/	0.0362	[M2]
	stable	/	/	0.0030	[M3]

Source: Prepared by researchers based on the program **Eviews10**

Permission according to the model[M3]:The series is stable after the first differences.

Table N 13: Test results "ADF" for the series "LNIMPALG" at level

a testADF for LNEXPALG Series, number of delays: minimum value= 0					
		H_0 :C=0	H_0 : b = 0	H_0 :λ=0	**models**
stable chain	The result	(Prob)	(Prob)	(Prob)	
	Unstable	0.0474	0.6587	0.4256	[M1]
	stable	0.0035	/	0.0161	[M2]
	Unstable	/	/	0.9230	[M3]

Source: Prepared by researchers based on the program **Eviews10**

As per model[M2] then Series LNIMPALG stable at level we've got LNEXPALG$\in I(1)$, LNIMPALG$\in$ I(0) And LNIDI$\in I(1)$,This prompts us to apply two approaches

- A study of the co-integration "Angel and Granger" between each of the LNIDI And LNEXPALG.
- Autoregressive Distributed Lag Model "ARDL" Between each of the "LNIDI" And "LNIMPALG".

4-3 Study of the co-integration of Engel and Granger between "LNIDI" and "LNEXPALG"

4-3-1 Co integration Test: In light of the previous unit root test, it became clear that each variable is an integral of the first degree, that is, the variables are not static in the level but are static in the first difference, and the co-integration theory focuses on the analysis of non-static time series, where Engel and Granger refer to The possibility of generating a linear mixture characterized by static from non-static time series, and if it is possible to generate this linear static mixture, then these non-static time series in this case are considered integrated of the same order and therefore it is possible to use the level of variables in the regression, and the regression in this case is not false, and described With the equilibrium relationship in the long run and the formation of the linear mixture of the study model is as follows:

$$\varepsilon_t = DLNEXPAJG - \alpha - \beta LNIDI$$

4-3-2 Results Co integration analysis using the "Angel and Granger" method: It is considered Co integration analysis, which was developed by "Engel and Granger", is one of the most important new concepts in the field of economic measurement and time series analysis for many economists. Then obtaining the estimated residuals, which are the linear mixture generated by the regression of the long-run equilibrium relationship, and the second step is to test the extent of the residuals obtained from the first step according to the following:

$$\Delta\hat{\varepsilon}_t = \alpha + \delta\hat{\varepsilon}_{t-1} + \Delta\hat{\varepsilon}_{t-1} + e_t \ldots\ldots\ldots\ldots(***) \quad , \quad e_t \sim IN(0)$$

If it is a statistic (pvalue) for teacher (ε_{t-1}) moral, we reject the null hypothesis that there is a unit root in the residuals $\Delta\varepsilon$ And we accept the alternative hypothesis with the stillness of the residuals and thus we conclude that the model variables, although they are not static time series, they are integrated of the same rank, and that the estimated relationship in the first step is a true and not misleading relationship, but if the residuals are not static in the level, there is no long equilibrium relationship The term between the two variables and that the previous relationship is misleading and cannot be relied upon.

Table N 14: Engel and Ginger's co integration test

the decision H_0 Acceptable	Prob=0.3212>0.05	dependent variable LNEXPALG	H_0 a Two chains are not cointegry, meaning there is no long-term relationship

Source Prepared by researchers based on outputs EVIEWS 10

We note from the table that there is no long-term co-integration between LNIDI" and "LNEXPALG". Thus, we conclude that there is no relationship between exports and the e-commerce index in the long run, so there is no need to enter the error correction limit in the model, the appropriate method for estimating is the autoregressive vector method VAR. On this basis, we study in the short term.

4-3-2 The study of the relationship in the short term "estimation of the Vector autoregression model "VAR): For the purpose of performing the estimation process using the autoregressive vector, it is required to determine the autoregressive rank, which is defined as one.

Table N 15: Estimation of Vector autoregression model (**VAR)**

signification	parameters	variables
0.02013	0.4363	LNEXPALG (-1)
0.3089	0.5326-	LNIDI (-1)
0,1109	6.7316	C

Source Prepared by researchers based on outputs EVIEWS 10

Through the results of the estimation, we note that the model is significant as<0.05prob fisher = 0.04 Its explanatory robust is somewhat acceptable, but we note the lack of significance of the parameters of the estimated model, and accordingly we can say that there is no effect in the short term for the e-commerce index on national exports.

4-3-3 Tests Model Diagnostics: We carry out a set of tests to diagnose the obtained model, so that we can rely on it in the economic interpretation.

Table N 16: Model Diagnostic Test Results

TEST RESULT	*STATISTICAL VALUE OF THE TEST*	*NULL HYPOTHESIS* H_0	*TEST TYPE*
PROB = 0.67 > 0.05 $FC > F_T$, H_0 *ACCEPTABLE*	*FC: 0.42 CHI-DEUX: 1.35*	*NO AUTOCORRELATION*	*SERIAL AUTOCORRELATION BETWEEN OF ERRORS LM*
PROB = 0.4807 > 0.05 $fc > f_t$, h_0 acceptable	*JAQUE BERA* 1.4647	*THE RESIDUALS ARE DISTRIBUTED NATURALLY*	*TEST FOR THE NORMAL DISTRIBUTION OF RESIDUALS JAQUE BERA*
prob > 0.05 $fc > f_t$, h_0 acceptable	*FC = 0.7018* prob = 0.52	*CONSTANT ERROR VARIANCE*	*VARIATION INSTABILITY TEST BREUSCH PAGAN GODFERY*

source: Prepared by researchers based on results EVIEWS 10

We note from the above table that the diagnostic tests were positive, that is, the model is free from the problem of self-correlation between errors and the instability of their variance, as they are distributed normally.

4-4 Autoregressive Distributed Lag Model "ARDL" between LNIDI" And "LNIMPALG":

Co integration Methodology Using ARDL model requires that co-integration tests be run as Granger and Johansen & Joselius, because the variables are integrated of the same degree and cannot be conducted in the presence of integrated variables of different degrees, and accordingly the

autoregressive Distributed Lag. Model (ARDL) appeared, developed by (Pesaran, Shin, & Smith), This model is considered an alternative to the well-known co-integration tests, so that this developed test is distinguished from the rest of the tests by the following: (nouria, 2015-2016)

- It does not require that all time series be complementary to the same degree I(0) or I(1), the only condition for applying this test is that the degree of integration of any of the variables is not I(2).
- model can be applied ARDL at the case if the sample size is small, and this is in contrast to most of the traditional co-integration tests that require that the sample size be large in order for the results to be more efficient, and the model enables us to separate the effects of the short-term from the long-term, through which we can determine the integrative relationship of the dependent variable and the variables independent of both the long and the short run in the same equation.

4-4-1 Determine the size of the effect of each of the independent variables on the dependent variable: Through this methodology, we can estimate the parameters of the independent variables in both the long and the short run, and its estimated parameters in the short and long run are more consistent compared to other methods such as the "Engel and Granger's" method and "Johansen-Jssels" method.

To determine the length of the distributed lag periods, two criteria are usually used(AIK) and (SC) Where the length of the period during which the value of each of (AIK) and (SC).

Model ARDL for the equation (1) It is written as:

$$d(lnimpalg_t) = c + \beta_0 lnimpalg_{t-1} + \beta_1 lnidi_{t-1} + \sum_{i=1}^{k} \alpha_{1i} d(lnimpalg)_{t-1} + \sum_{i=1}^{k} \alpha_{2i} d(lnidi)_{t-1}$$

The parameter of the dependent variable slowing down for one period on the equation is (β), the parameters of the long-run relationship, while the parameters of the first differences are considered (α), short period parameters, and (C) Indicate the categorical part and random limit errors respectively.

The form test includes ARDL In the first, we test the existence of a long-term equilibrium relationship between the model variables as well as the parameters of the independent variables in the short term, and for this we calculate the Fisher statistic(F) through (Wald test), where the null hypothesis is tested by the lack of co-integration between the model variables (the absence of a long-term equilibrium relationship) and then we compare it with the Pearson tabular values for the critical values of the upper and lower limits at significant degrees.

4-4-2 Study results: After defining the model and the study variables, we shed light on the results of estimating the model

A- Co integration test using the bound test method: The following table shows the boundary test(ARDL) by calculating the Fisher statistic and comparing it with the upper critical values I(1) and the lower I(0), as mentioned before, in order to test the null hypothesis that there is no co-integration, and the results were as follows:

Table No 17: The bound test approach to test the hypothesis of the existence of a long-term relationship

THE RESULT	FISHER'S COMPUTED STATISTIC FC		
THE EXISTENCE OF A CO-INTEGRATION RELATIONSHIP	6.750397		MODEL
	MINIMUM I(0)	THE HIGHEST RATEI (1)	CRITICAL VALUES
	5.77	6.68	AT A MORALE LEVEL2.5%
	5.77	5.73	AT A MORALE LEVEL5%
	4.04	4.78	AT A MORALE LEVEL10%

Source: Prepared by researchers based on results EVIEWS 10

What is the value ofThe calculated F is significant and greater than the critical values for the upper bound at the significance level of 2.5%, 5% and 10%, so it is in the area of co-integration, and thus there is a long-term equilibrium relationship between the study variables.

B-Conclusion of the long-term relationship:

Table No18: Estimations of Long-Term Parameters "LNIMPALG Dependent Variable**"**

Morale	**parameter**	**the variable**
0.9776	0.009417	LNIDI
0.0000	10.794641	C

Source: Prepared by researchers a depend on consequences EVIEWS 10

Choosing the lagging values (1.0), when we introduce the niberian logarithm into the study model, the parameters of this model become elasticities, that is, if one of the independent variables changes by one unit,

the change in LNIMPALG with the parameter value, then on this basis the results of estimating long-run parameters will be interpreted.

The form is significant as it is estimated Prob (fisher)=0.0174

We note that the parameter of the e-commerce index ratio "the development of information and communication technology" is not significant in the long run, although it can be explained economically that its impact is positive and this is consistent with the theory.

C-Estimating the error correction model for a model ARDL (DLNIMPALG): After confirming the long-term relationship, we will derive the short-term relationship between the variables, using the non-structural error correction model.

Table No19: Error Correction Model estimates models UECM for model ARDL

Morale	**coefficient**	**the variable**
0.0190	-0.498145	CoinEq (-1)
0.0977	0.004691	DlnIDI
0.0183	0.5018	DlnImpalg (-1)

Source: Prepared by researchers based on results EVIEWS 10

We got the error correction limit ECM(-1)With a negative and significant sign, which confirms the existence of the equilibrium relationship in the long run, and this rate is considered the speed of correcting the imbalances that occur in the short term in the long term, just as in the short term there is an impact of information and communication technology on national imports, in addition to the presence of a moral effect between the variable under study And its historical value for previous periods, taking into account the duration of the study, which is considered short (12 years), due to the lack of sufficient data about IDI.

D- **Tests Model Diagnostics:** We will carry out a set of diagnostic tests for the obtained model so that we can rely on it in the economic interpretation.

Table No 20: Model Diagnostic Test Results

TEST RESULT	*STATISTICAL VALUE OF THE TEST*	*NULL HYPOTHESISH0*	*TEST TYPE*
PROB = 0.49 > 0.05 *FC > FT, H_0 ACCEPTABLE*	*FC: 0.80* *CHI-DEUX: 2.32*	*NO AUTOCORRELATION*	*SERIAL AUTOCORRELATION BETWEEN ERRORS LM*
PROB = 0.62 > 0.05 Fc > Ft, H_0	*JAQUE BERA* 0.9413	*THE REMAINS ARE DISTRIBUTED NATURALLY*	*TEST FOR THE NORMAL DISTRIBUTION OF*

acceptable			*RESIDUALS JAQUE BERA*
Prob > 0.05 Fc > Ft, H_0 acceptable	*FC = 0.041* Prob = 0.84	*CONSTANT ERROR VARIANCE*	*VARIATION INSTABILITY TEST BREUSCH PAGAN GODFERY*

Source: Prepared by researchers based on results EVIEWS 10

We note from the above table that the diagnostic tests were positive, that is, the model is free from the problem of self-correlation between errors and the instability of their variance, as they are normally distributed.

5-ANALYSIS OF THE RESULTS OF THE BENCHMARKING STUDY OF THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON ALGERIA'S FOREIGN TRADE:

We conclude from the standard study of the impact of e-commerce "information and communication technology development index" on the Algerian foreign trade operations "exports and imports" the following:

Impact on Exports: The indicator of the development of information and communication technology does not affect national exports in the short term.

Impact on imports: The indicator of the development of information and communication technology affects national imports in the short term.

In general, it can be said that national exports are not affected by the ICT development index due to the economic nature of the state, which is its great focus on the hydrocarbons sector, which represents the bulk of its exports. The efforts made to join the digital economy and develop the information society and direct it towards electronic commerce, according to the results of the United Nations Conference on Trade and Development UNCTAD" Algeria ranked 85th globally in 2016, and 97th during 2017 in the ranking of the best B2C e-commerce economies, while South Korea ranked fifth, Japan ranked eighth, New Zealand ranked tenth, and the first seven ranks European countries have advanced in their ranking due to their advanced financial sectors, their availability on secure servers for users and the wide spread of the Internet, as well as their availability on advanced logistics networks characterized by a high degree of postal reliability according to the Universal Postal Union. As for Algeria, despite its efforts in the field of e-commerce, it is still far away. It fell below the required level, especially as it fell in the rankings, as it ranked 107th during 2019, while it had the best ranking ever in 2020, according to the United Nations Conference on Trade and Development.

Table No.21: Comparing Algeria with the most important developing economies according to the e-commerce index **B2C"**

Order 2017	Country	%age of people using the internet (2016)	% of individuals with an account (2016)	Number of scure internet rings per million inhabitants (2016)	Degree of postal reliability (2016)	General Index (2016)	Order (2016)
1	Luxembourg	97	96	98	94	96.5	1
2	switzerland	89	98	100	99	96.4	8
3	Norway	97	100	96	93	96.4	3

The percentage change in the value compared to the previous year	Current year index value	The degree of reliability of electronic systems	Internet use insurance	Quotas of individuals from using electronic accounts	Quotas of individuals using the Internet	Category	year
4	Netherlands	90	90	99	95	95.9	2
5	South Korea	93	94	96	99	95.5	4
6	United Kingdom	95	99	92	95	95.1	10
7	Sweden	92	100	94	93	94.6	7
8	Japan	92	97	89	97	93.8	9
9	Germany	90	99	93	92	93.5	14
10	New zealand	88	100	90	95	93.3	11
97	Algeria	43	50	31	26	38	85

Source: Ibrahim (Ibrahim, 2018, p. 157)

Table No.22: Classification of Algeria according to the e-commerce index **B2C"Source ;** (UNACTA, 2018)

14	52.5	73	33	43	60	**80**	**2020**
-4.2	38.2	10	40	43	60	**107**	**2019**
0.5	36.3	18	41	43	43	**111**	**2018**
/	/	26	31	50	43	**97**	**2017**
/	32.3	68	37	6	18	**85**	**2016**

Source ; (UNACTA, 2018)

6- Conclusion :

Foreign trade is a branch of the national economyThe mirror of the economy of every country, it is the main engine of growth and economic development, as no country can be independent of its economy from the rest of the world, and the coincidence of the emergence of the information revolution and the development of communications with the rule of the new economic system based on globalization and trade liberalization is the most prominent of the so-called e-commerce that has developed It has grown with the expansion of the use of the Internet and made the world a single market in which opportunities granted to all economic operators are equal, which gave foreign trade a new look that made it conquer the entire world.

E-commerce has achieved impressive results in recent years, especially at the level of developed countries. Perhaps the experiences of some Arab countries that have witnessed great transformations in their transition to the digital world will be the biggest incentive that encourages Algeria to move forward towards joining the ranks of the digital economy, developing the information society and directing it towards electronic commerce, which has become An urgent necessity to increase its contribution to world trade, as well as to develop its national productive sectors, and to provide increased opportunities to raise its economic growth rates in light of the acceleration of the current technological transformations, which are a prominent feature of the features of the twenty-first century.

From this point of view, we focused in our study on familiarity with the features of both foreign trade and e-commerce, while highlighting the economic impact of e-commerce on Algeria's foreign trade operations.

Hypotheses testing:

- **First hypothesis:** Algeria's exports are not affected by e-commerce.

Algeria's exports are not affected by e-commerce due to the different relationship between them, because Algeria's economy is largely concentrated in the hydrocarbons sector, which represents the bulk of its exports. Nevertheless, the adoption of e-commerce is one of the most important challenges that Algeria has sought to achieve.

- **The second hypothesis:** Algeria's imports are not affected by e-commerce.

The e-commerce market in Algeria is modest and inactive compared to some Western and Arab countries. It includes some websites that engage in electronic commerce activities. The reason for this delay in e-commerce is the low awareness among members of society of the importance of carrying out commercial transactions via the Internet as well as electronic payment operations. In addition to the failure of the Algerian banking system in adopting modern electronic payment systems, which are considered as a mainstay for the growth and development of electronic commerce, and in order to promote the e-commerce market, Algeria has approved the legislation regulating it, in particular Law No. 18-05 of 24 Shaaban 1439 corresponding to May 10 The year 2018 is related to e-commerce.

As is the case in the international business environment, the Algerian economy has become more open to a competitive environment different from the conditions in which it arose, which necessitated the Algerian state to reconsider its commercial and economic practices, and move towards integration into the global economy based on free trade and information and communication technology and keep pace with all Modern economic developments, where the adoption of electronic commerce is one of these challenges that Algeria sought to achieve, but it faced a number of obstacles and obstacles that prevented it.

Perhaps the most important recommendations for establishing e-commerce in Algeria are to strive to establish an infrastructure and to follow a comprehensive and purposeful strategy in this regard.

7- Références

arpce. (2021, june 04). *Control authority for Algeria Post and Telecom*. Récupéré sur arpce: //www.https://www.arpce.dz/ar/doc/raa,

Diab, M. (2010). *interntional trade in age of globalization.* Beirut: Dar elmanhal Labanon.

Ibrahim, M. (2018). The reality and challenges of e-commerce in Algeria. *Journal of Law Human sciences*, ziane el achour eniversity.

International Telecommunication Union. (2019). *International Telecommunication Union Data*. Récupéré sur https://www.itu.int/en/ITU-D/Statistics.

Mamdouh, I. K. (first edition 2008). *electronic-commerce logistics.* Alexandria egypt: Dar University Thought.

Mouloud, M. (2019). *commerce electronique.* Algeria: Dar Houma of publishing and distribution.

ncsi. (2021). *ncsi*. Récupéré sur ntional cyber security index: // https://ncsi.ega.ee/count

nouria, k. (2015-2016). *comportement strat&gique des firmes et commerce internatiobal.* tlemcen: université de Tlemcen.

report, t. s. (2010). *2010.* WTO issues.

UNACTA. (2018). *Conference on trade and Development around the information economy.* united nations.

worldbank. (2021). *data.world bank.* Récupéré sur the world bank: https://data.worldbank.org/indicator