



## ***The Role of E-Commerce in Promoting Foreign Trade Statistical Study Using PCA Data in Algeria (2000-2018)***

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### **Abstract:**

This study aims to show the role of electronic commerce in promoting foreign trade. The descriptive analytical method was adopted by first highlighting the most important concepts related to the two variable, then the stage of showing the relationship between them. Also, the statistical method was adopted by applying the principal component analysis (PCA) to a set of selected indicators for the period (2000-2018), The study concluded that: Algeria suffers from delays in many indicators, which made the volume of its foreign trade weak and its trade linked to the hydrocarbons sector.

**Keywords:** e-commerce; the Algerian economy; foreign trade; data analysis PCA.

**Jel Classification Codes:** L81,F1.

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## **1. Introduction**

Today, science and technology have become the engines of economic growth, and that knowledge has become the basis for creating wealth. The traditional economy based on capital and work has declined as the two most important elements in production; to open the way for a new economy that primarily depends on knowledge in order to achieve the required added value. This technology formed the axis of a commercial transformation that resulted in a change in the behavior of producers and consumers alike. Subsequently, some rules of commercial transactions changed and resulted in a new type of commercial exchanges based on the rapid flow of information and faster response to sudden changes, in addition to the abolition of geographical borders, which is called e-commerce

The foreign trade sector is one of the most important pillars upon which the country's economy is built, as it allows to obtain hard currency through exchanges with the outside world. Foreign trade is like a bridge to deal with the countries, including the developing countries which have realized the effective role that foreign trade plays in correction of the national economy.

Given that Algeria's integration into the global economy has become a necessity dictated by global developments and intense competition between foreign and even Arab countries, it has become necessary to work on developing its e-commerce in order to upgrade its foreign trade and kill two birds with one stone, and this will only be achieved by developing its digital infrastructure as the first step for the development of the information and communication technology sector

### **-The problem of study:**

Through what was presented above, the following main question can be asked: **To what extent does e-commerce contribute to promoting foreign trade in Algeria?**

**-The importance of study:**

The issue of e-commerce derives its importance from the current technological developments, the level of development and the tremendous technological progress witnessed by the countries, in addition to its great challenges in promoting foreign trade which the latter works to provide hard currency by exporting the productive surplus to countries, and thus leads to the development of the concerned economy commercially and economically and reaching acceptable levels of economic growth rates.

**- The objectives of the study:**

An attempt to present a statistical analytical study of the e-commerce and foreign trade sectors in Algeria; and to determine the volume of foreign trade by monitoring the values of the Algerian trade balance, especially in light of the continuous fluctuations in oil prices; in addition to extracting the most important strengths and weaknesses of Algeria within the two indicators of e-commerce and foreign trade together; and to what extent does the former trade contribute to the promotion of the latter trade in Algeria.

**- Review of literature:**

- **(Qudeh, 2019/2020)**, This study aimed to measure the effects that can result from foreign trade liberalization policies on economic growth, especially that trade liberalization programs mainly aim to improve efficiency in the allocation of resources and the exploitation of production capacities through the liberalization of foreign trade in all its basic aspects.

This study concluded that the increase in economic growth is related to liberalization procedures, as it found that both foreign investment as well as total fixed capital formation (investment in the private sector) play a prominent role in raising economic growth rates, also the increase in the rate of trade liberalization is one of the most important factors driving the increase in economic growth rates.

**(Karima, 2013/2014)**, This study aimed to shed light on e-commerce as one of the new concepts in the economic world and this is due to its rapid growth. The volume of e-commerce is witnessing a remarkable development at the global level, especially with the expansion of the

use of information and communication technology, the emergence of the internet and the speed of its spread and its ability to connect dealers in different parts of the world, which led to a change in the traditional trade in the world.

The importance of this study was represented in the fact that e-commerce is one of the things that opened new horizons for enterprises of all shapes and sizes in the areas of distribution of goods as well as investment as it more facilitates and regulates trade exchange processes.

- (Somaya, 2020), This study aimed to determine the various economic effects that may result from economic integration agreements, especially agreements that seek to join the Arab Free Trade Area as one of the most important Arab trade blocs, which has become an imperative necessity for all countries in the region to develop and upgrade foreign trade movements through encouraging import and export operations and opening the way for them without obstacles or barriers, and all this in light of the various changes that the economic world witnessed in the twentieth century, especially with the information revolution and the tremendous development in technology in various fields. Besides, this study was interested in knowing the various changes that affected many aspects related to foreign trade in Algeria before and after joining the Arab Free Trade Area, and how these blocs contributed to moving economic growth in its various aspects outside the hydrocarbon sector.

The current study was distinguished from previous studies in that; we followed the statistical approach to analyze the basic compounds based on the Exel Stat 19 program to analyze the data represented by the indicators of foreign and electronic trade together using the principle component analysis(PCA).

## **2. CONCEPTS ABOUT E-COMMERCE AND FOREIGN TRADE**

E-commerce represents one of the topics known as the "digital-economy", where the digital economy is based on two facts: E-

Commerce and Information Technology. It is the technology and information industry in the era of computing and communication that created The realistic existence of e-commerce as it depends on computing, communication, the Internet and various technical means to implement and manage commercial activity, whether domestic or external. The digital economy is considered one of the economics that specializes in studying the extent of interdependence between countries, and this latter is increasing continuously with the increasing degree of globalization of the economy and markets

### **2.1. What is e-commerce?**

One of the most prominent results of globalization and economic openness is the emergence of electronic commerce that relies on information and communication technology, as it has become one of the most reliable methods at the present time due to its high speed and the access of information to more than one party at the same time. Below we will discuss the concept and importance of electronic commerce.

#### **2.1.1. E-commerce concept**

The twenty-first century is witnessing the re-engineering of commerce, as the transition from traditional commerce to e-commerce is taking place, where buying and selling will be automated and profitable, information will flow over the internet in an instant and without cost, and sellers will find it easy to know the best sellers, the best products and the best prices, and thus the volume of e-commerce will increase.

The term e-commerce expresses the use of computers and communication technology in the exchange of goods, services and information, as through this technology, the effective link between sellers and buyers, the exchange of products and information and the transfer of funds. (KAFI, 2017, p. 92)

The concept of e-commerce refers to the marketing of products via the international internet and the unloading of electronic programs without going to the store or to the company. Moreover, e-commerce includes communications between various companies at the local or

international level, which facilitates the process of trade exchange and increases its volume (BERRICHE, 2004, p. 12)

E-commerce is also defined as the use of information technology to enhance communications and deals with all parties with interests in the company such as customers, suppliers, government institutions, financial institutions, managers, employees and the public. (CHIKH & AOUAD, 2005, p. 03)

### **2.1.2. The importance of e-commerce**

The importance of e-commerce is based on the following points: (MAROUF, 2012, p. 18)

- It is considered an effective way to conclude deals between dealers through direct electronic communication between them. Thus, it dispenses with paper documents and the expenses involved. It also saves general and administrative expenses, communication expenses, and others;
- It is a unique and unprecedented way to reach all the world's markets at the same time with the lowest expenses, as it helps sellers to overcome the barriers of distances and access to far, diverse and multiple markets. It also helps buyers to overcome the barriers of time and deal with suppliers;
- It leads to the exchange of benefits between dealers, including sellers and buyers, and works to rationalize the decisions taken by each of them, due to the information flow between them in a timely, coordinated and accurate manner.
- Contribute to simplifying and organizing project operations and achieving their goals by eliminating delays in issuing administrative decisions, preventing errors and reducing costs;
- It helps companies to follow modern manufacturing systems that are carried out with the help of electronic computers in terms of determining the succession of operations on parts of the product, and control operations and planning the requirements for materials, manufacturing resources and the specified time.

### **2.2. General Concepts of Foreign Trade**

Foreign trade is one of the branches of economics that deals with the study of interdependence between countries of the world, and

this interdependence is increasing continuously with the increasing degree of globalization of the economy and markets, and the following will be addressed to the most important concepts related to foreign trade.

### **2.2.1. The concept of foreign trade**

There are several definitions and concepts of foreign trade, including, but not limited to the following:

It is a system (total) of commodity-monetary relations that consists of the total foreign trade of all countries of the world, and international trade can be practiced by natural or legal persons, as well as governments and various international companies .(DIAB, 2010, pp. 09-10)

It can also be defined as: “The process of transferring goods and services between countries, which is regulated through a set of policies, laws and regulations that are held between countries, and international trade is considered a microeconomic science, as it is concerned with partial units such as export, import, etc. (EZZABOUN, 2015, p. 15)

### **2.2.2. The importance of foreign trade**

The importance of international trade in the global economic system and the applicability of international exchange of goods and services is due to important factors, the most important of which are: (MENACERI & MEKID, 2010, p. 833)

- It is considered the direct means of strengthening international relations because of its role in linking countries together;
- It supports the marketing ability by creating many new markets for various products, and it also contributes to providing many services and goods based on the principle of specialization that provides products at the lowest prices;
- Classified as one of the important indicators for measuring the capabilities of countries to compete and market products and production in global and international markets;

- It helps in building strong economic systems, and promotes sustainable development in them by providing key information and appropriate technological means.

### **2.2.3. foreign trade goals**

Foreign trade aims to play a distinguished role in economic, social and political life. Through these goals, it is possible to define the features of the state's policy with other countries that result in the establishment of foreign trade. Among the most important foreign trade goals that it seeks to achieve are the following: (HAAM & others, 2002, p. 25)

- Mobilizing production elements and increasing the ability to exploit and mobilize them to serve the national economy;
- Protection of the national economy from external measures such as crises and chaos in the markets;
- Finding solutions applicable to government taxes on agricultural and industrial goods;
- Defining para-tariff and non-tariff barriers, as well as reducing or eliminating tariff and administrative barriers;
- Removing technical obstacles to trade in order to protect consumers and products, and the second country exports a certain type of products or raw materials needed by the second country, and thus the relations are intertwined and the countries are connected to each other commercially.

### **2.3. The role of e-commerce in promoting international trade**

Telephone and fax have already contributed to the acceleration of communication between trading partners across international borders, the internet also encourages international trade by making communications available and much cheaper and faster, as well as the presence of a large number of goods in digitized services that can be transferred electronically, which saves a lot of time and shipping costs and is expected to occur significant increase in this quality of goods.

On the other hand, e-commerce and internet services indirectly affect the increase in the volume of international trade by facilitating the process of international trade and customs administration, as well as electronic submission of commercial documents is the norm in a

number of countries in the world, where more than 90% of documents are submitted electronically in developed countries.

In the future, it is expected that the internet will further facilitate international trade with the growth of new applications in this field.

E-commerce and the internet can facilitate many aspects of international trade, for example, the widespread use of e-commerce tools in customs administrations at the international level greatly facilitate international trade operations, as e-commerce tools facilitate the processes of estimating customs duties that reach to huge amounts at the international level.

The advanced information technology also helps to monitor, update and simplify customs procedures, including the use of notification methods that allow for voluntary inspection of consignments, and other tax procedures.

Informatics in developed countries has been able to provide an electronic catalog that can calculate all the operations that take place through e-commerce, and then how to calculate the amount of prescribed taxes, especially since it is known in developed countries that almost everyone can calculate the amount of taxes imposed on him, and electronic commerce enables quick access to the global markets very quickly and with little expenses (Essayed, 2009, pp. 269-270). Perhaps one of the most important effects of e-commerce on international trade is its impact on skilled labor services and their rate of return, as the services of this labor can be sold abroad without the movement of natural persons through the internet.

So it is clear from the above that electronic commerce has an important role in increasing the volume of international trade and its prosperity.

### **3. A statistical study of the indicators of foreign trade and e-commerce using the method of principle component analysis PCA**

A number of these indicators were chosen for the purpose of applying the applied study, by applying the method of principle component analysis (PCA) as it is the most appropriate in analyzing the data, and to clarify the most important relationships between the various variables from where it is positively or negatively related,

dispersed and concentrated, and as the most important point is to extract the most important strengths and weaknesses that distinguish and hinder indicators of foreign trade and e-commerce in Algeria.

### **3.1 Diagnosing the reality of indicators of foreign trade and e-commerce in Algeria for the period (2000-2018) using PCA.**

The study model is based on a set of indicators related to e-commerce and foreign trade, the data of which were collected from various reports from the World Bank, the ministry of finance, the National Bureau of Statistics and others, where difficulties were found in finding all the data of the study - the index of internet users and internet servers for the first years of the study -

#### **3.1.1. Presentation of the data table**

The study sample consists of 13 indicators selected from among the indicators of foreign trade and e-commerce represented in: the indicator of political stability and absence of violence, the indicator of the quality of regulatory frameworks, the ratio of foreign trade to GDPPIB, mobile phone subscriptions (per 100 people), inflation rate, exchange rate, balance trade, economic freedom index, fixed telephone subscriptions (per 100 people), secured servers, internet users (per million people), trade openness, balance of payments as a percentage of the GDP for the state of Algeria for the period (2000-2018) shown in Appendix No. (1) Some indicators were also excluded due to the difficulty of finding data, especially in the same period.

After applying the PCA method to the data of Annex No. (1) using the Stat XL program, we obtained the results shown - the mean and standard deviation - in Annex No. (2):

The indicator variable of political stability and absence of violence is responsible for the localization of the variables because it is characterized by the smallest standard deviation (**0.239**), while the variable of the trade balance is responsible for its dispersion because it is characterized by the largest standard deviation (**1504.339**).

#### **3.1.2. Bartlett Test (Foreign Trade and E-Commerce Indicators)**

After defining the correlation matrix shown in Appendix No. (3), the approved Bartlett test will be done in the hypothesis test, and

the following table shows the results of the Bartlett test (foreign trade and e-commerce indicators for the period 2000-2018).

**Table 1. Bartlett Test Results (indicators of foreign trade and e-Commerce for the period 2000-2018)**

Khi <sup>2</sup> (observed Value)	Khi <sup>2</sup> (critical Value)	DDL	P-Value	Alpha
317,225	99,617	78	<0.0001	0.05

**Source:** prepared by the researcher based on: 2019 STAT XL program outputs.

where:

- **The null hypothesis H<sub>0</sub>:** There is no significant correlation other than zero among the studied variables.
- **Alternative Hypothesis H<sub>1</sub>:** There is at least a significant correlation different from zero among the studied variables.

We also note that the calculated value of Khi2 (317.225) is greater than the critical value (99.617), including rejection of the null hypothesis H<sub>0</sub>, and acceptance of the alternative hypothesis 1H, that is, there is a significant correlation between the various study variables at a degree of freedom of 45 and a level of significance of 0.05%

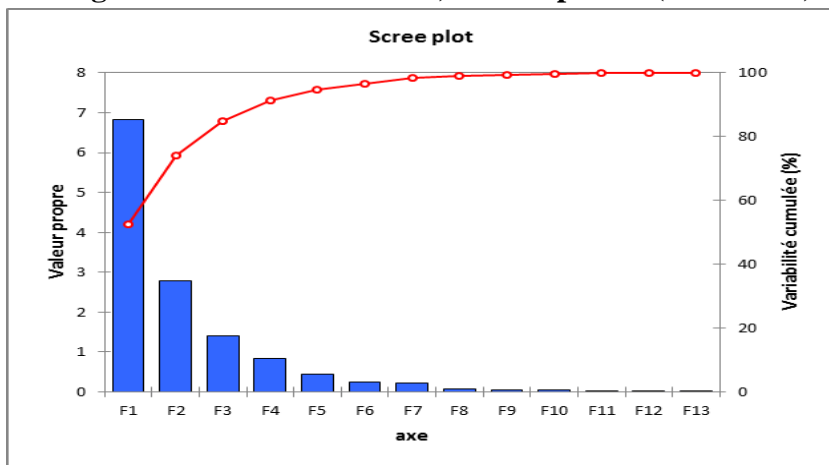
### 3.1.3. Eigenmic values and inertia ratio

**Table .2 Subjective values and stagnation rates (indicators of foreign trade and e-commerce) for the period (2000-2018)**

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
Valeur propr	6,839	2,794	1,414	0,837	0,446	0,241	0,212	0,085	0,046	0,042	0,029	0,008	0,006
Variabilité (%)	52,611	21,495	10,878	6,437	3,430	1,858	1,632	0,658	0,351	0,325	0,221	0,062	0,043
% cumulé	52,611	74,106	84,983	91,421	94,851	96,708	98,340	98,998	99,349	99,674	99,895	99,957	100,000

**Source:** prepared by the researcher based on: 2019 STAT XL program outputs.

**Fig.1. Graphical representation of eigenvalues (indicators of foreign trade and e-commerce) for the period (2000-2018)**



**Source:** prepared by the researcher based on: 2019 STAT XL program outputs.

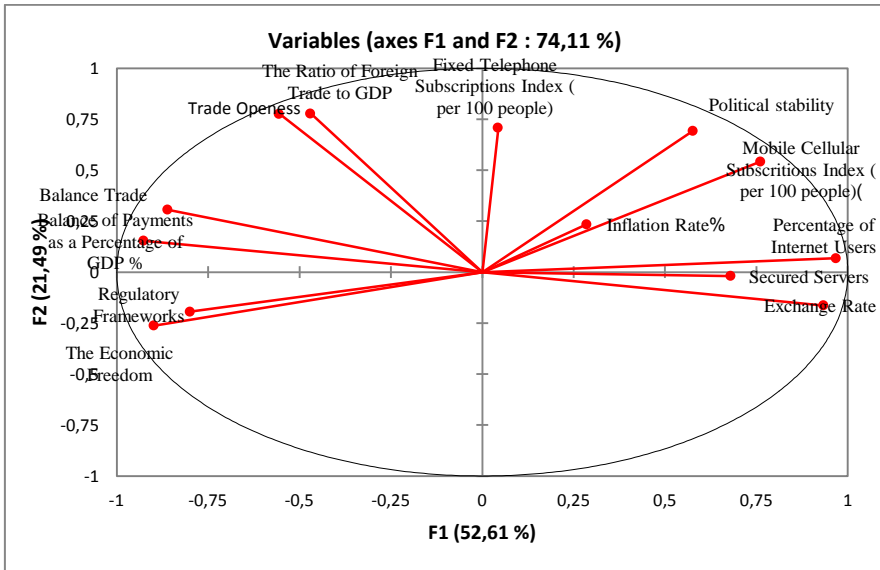
- The  $F_1$  factor axis represents 52.611% of the total inertia value.
- The factorial axis  $F_2$  represents 21.495% of the total inertia value.

Thus, the representation percentage on the first factorial parameter with two axes ( $F_1 F_2$ ) will be 74.106 % of the total inertia, which is a good and sufficient percentage to give a clear picture of the cloud of points on this feature, so we are satisfied with representing the variables on an orthogonal and homogeneous two-dimensional parameter ( $F_1 F_2$ ).

### **3.2 Extracting Algeria's strengths and weaknesses according to the selected foreign trade and e-commerce indicators for the period (2000-2018)**

The strengths or weaknesses of the Algerian economy can be deduced according to the indicators of the study, through the circle of correlation between the variables according to the following figure:

**Fig.2. Correlation circle between variables (indicators of foreign trade and e-commerce) for the period (2000-2018)**



**Source:** prepared by the researcher based on: 2019 STAT XL program outputs.

**3.2.1. Algeria’s strengths according to indicators of foreign trade and e-commerce for the period (2000-2018)**

Through Figure No. (2) we notice that Algeria is characterized by strengths represented in: the fixed telephone subscriptions index (per 100 people), the political stability and absence of violence index, the mobile phone subscriptions index (per 100 people), the inflation rate, the percentage of internet users (per million people) and the secured servers index, which we will address separately for each indicator in the following:

- **Indicator of political stability and absence of violence:** Algeria enjoys political stability, especially after the black decade. During the study period (2000-2018), Algeria has not been subjected to any external aggression or skirmishes with the people and security. As an example of the demonstrations, the demonstrations of February 22, 2019 were the largest example of the Algerian people’s awareness and his avoidance of violence, especially if we compare it with neighboring countries such as Egypt, Tunisia and

Libya, and what resulted from insecurity under the name of the Arab Spring revolutions (HALIMI, 2019/2020, p. 255);

- **Mobile phone subscriptions index (per 100 people):** The strengths or advantages of the competitiveness of the mobile phone sector in Algeria can be determined through the ease of moving the customer from one operator to another due to low costs moving, the customer can subscribe to more than one operator, which increases the competitiveness of this sector by always providing the best. In addition to the fact that the fixed telephone is the only alternative competing with the mobile phone and the demand for it declined, where in 2001, it decreased from 95% to 10% in 2008, in contrast to the high demand on the mobile phone from 5% to 90% and the Algerian consumer today prefers to subscribe to the mobile phone service over the fixed phone. What supports Algeria's strength according to this indicator is the intense competition between the three operators (Djezzy, Mobile and Ooredoo), which made each operator strives towards achieving a competitive advantage over the rest of the operators;
- **Fixed telephone subscriptions index (per 100 people):** the study model revealed that the fixed telephone subscriptions index is one of the strengths of e-commerce indicators, and it is a very important indicator, especially as it is linked to the internet, and also is considered an important means of dealing with fax;
- **Exchange and inflation rate:** The exchange and inflation rate are among the important indicators in foreign trade as well as e-commerce, and according to the above figure, they came within the strengths category for the period (2000-2018). Inflation rates have witnessed somewhat acceptable levels, especially in recent years ,and after witnessing its highest rate in 2011 at 8.9%, and then it gradually decreased and reached 1.95% in 2018. As for the exchange rate, it can be considered a strong point as it encourages exports and thus the cost of exports is lower than countries with a higher exchange rate and thus more profits;
- **Percentage of internet users (per million people):** The percentage of internet users is one of the important indicators that

express e-commerce, especially since e-commerce operations are carried out via the internet while ensuring the speed of its flow, especially in light of the tremendous technological progress, it is unreasonable to find a country developed in the aspect of its e-commerce without its corresponding development in the internet;

- **Secured servers index:** The number of secured servers witnessed a noticeable increase throughout the study period (2000-2018). Its number was 4 in 2005, to gradually rise to 309 in 2016, after then they jumped in 2017 and 2018, reaching 2,621 and 2,855, respectively.

### **3.2.2. Weaknesses of Algeria according to the indicators of foreign trade and e-commerce for the period (2000-2018)**

Through the correlation circle No. (2), we deduce Algeria's weaknesses according to the indicators of foreign trade and e-commerce, and their indicators can be clarified separately according to the following:

**The ratio of foreign trade to GDP:** Although the ratio of foreign trade to GDP is considered an indicator of weaknesses according to the study model, it represents, on the other hand, the best indicators of its group in view of the improvement in its ratios in general, which was also evident through the current account deficit or surplus ratio to the GDP, where the trade surplus during a long period of study (2000 - 2014) was reflected in considering these indicators the best among the set of weaknesses, while the new economic situation had an impact on this classification since 2014;

**The economic freedom index:** The economic freedom index is one of the very important indicators in the field of foreign trade. We find a direct relationship between the economic freedom index and foreign trade, but the study showed that the economic freedom index is one of the weak points of the Algerian economy, due to the weakness of the sub-indicators of this indicator; these are: property rights, judicial effectiveness, government integrity, tax burden, government spending, financial health, freedom of work, free employment, monetary

freedom, freedom of trade, and this weakness naturally affected the volume of foreign trade;

**Regulatory frameworks indicator:** In any suitable economic system, it is required to provide a legal, regulatory and institutional framework. However, the study proved that Algeria does not enjoy this system and lacks sufficient flexibility to keep pace with changes and events, especially in light of the developments in the world in various fields;

**Trade openness:** The trade openness index is one of the most indicators that measure a country's commercial strength, especially since trade openness measures the development and growth of the country's economy, and the commercially open country is characterized by keeping pace with the economic changes taking place in the world. Trade openness helps the country to attract investors in various fields which this leads to an increase in investments, especially real investments, and subsequently an increase in GDP and value of the national currency against foreign currencies, which is what Algeria lacks, especially in light of its non-joining of the World Trade Organization. The study revealed Algeria's weakness according to this indicator;

**Balance of trade and payments as a percentage of GDP:** The balance of trade and payments indicators are the two most important indicators that express the volume of foreign trade, given that the first indicator represents the difference between a country's exports and imports, and it is noticed from this study that these two indicators are considered weak points of the economy this is due to the lack of diversification of the economic sectors contributing to the gross domestic product, and they are limited to the hydrocarbons sector, which in turn is affected by its fluctuating prices between decline and rise.

### **3.3. The development of indicators of foreign trade and e-commerce in Algeria**

Through this requirement, the development of the Algerian economy will be addressed according to the indicators of foreign trade

and e-commerce, during the period (2000-2018), through its progress or delay, according to the years of study.

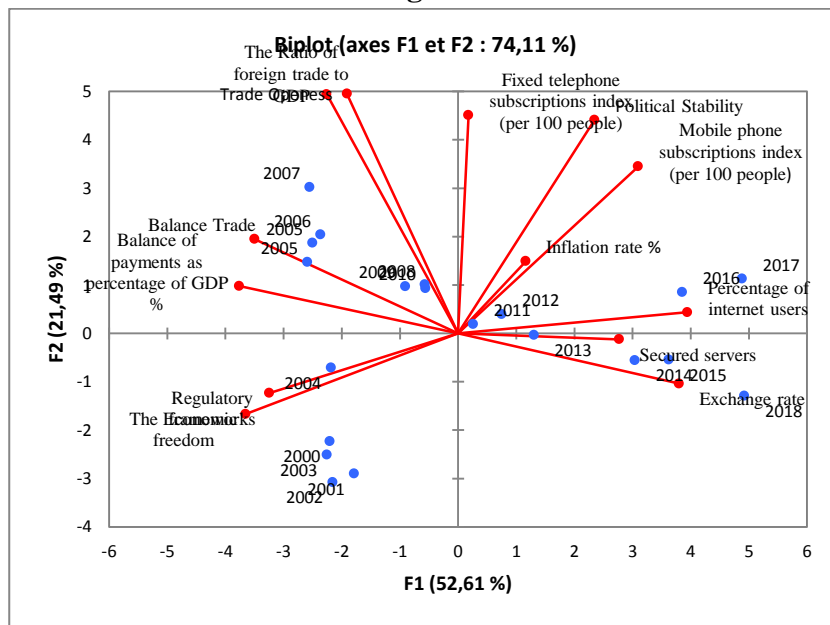
### **3.3.1. Phase I (2000-2010)**

We notice from the figure that (3) Algeria at this stage witnessed a weakness in some foreign trade indicators represented in: the regulatory frameworks index; the economic freedom index; the trade balance; foreign trade as a percentage of GDP; the balance of payments as a percentage of GDP; trade openness. As for the weaknesses of e-commerce indicators, we find that they do not exist and are classified among the strengths, but they remain weak if they are compared to other countries, according to what was found by the study model, as this period coincided with the economic recovery program and the supplementary program to support growth through which fantastic sums were spent, the main objective behind these two programs was to improve living conditions and reduce unemployment, in addition to developing human resources by upgrading the educational level. The commercial aspect was marginalized during this period.

### **3.3.2. Second Phase (2011-2018)**

The period (2011-2018) witnessed a development in the indicators of foreign trade represented in: the exchange and inflation rate, the indicator of political stability and the absence of violence, and the e-commerce indicators represented in: mobile phone subscriptions (per 100 people), fixed phone subscriptions (per 100 people), the percentage of internet users (per million people), secured servers. These indicators were classified as strength indicators of the Algerian economy. The improvement in the last years of the study was a major reason for classifying them according to the strength field.

**Fig.3. Graphic representation for the period 2000-2018 of indicators of foreign trade and e-commerce**



**Source:** prepared by the researcher based on: 2019 STAT XL program outputs.

#### 4. Conclusion

The tremendous progress in information and communication technology has led to a great information revolution, and the world has become a small village by canceling borders and geographical scope. Today, technology has become one of the main pillars for countries to advance their economies, which made countries fiercely compete to keep pace with new changes, so to be e-commerce an crucial hub for promoting foreign trade, given that the latter has great importance in bringing hard currency and revitalizing the economy in terms of trade exchanges that occur between countries. Algeria, like other countries, has shown its interest in the field of modern technology, which will naturally affect all fields and economic, social and even political levels. Consequently, it affects production and employment and increases the national income and its per capita income.

**-Results**

The study concluded a number of results, which we summarize as follows:

- The global nature of e-commerce has eliminated all limits and restrictions on entering commercial markets, and thanks to it, the world has turned into an open market to the consumer, regardless of the geographical location of the seller and buyer. E-commerce works to easily meet customer's options;
- With the gradually changing of the new world system to become an electronic world on its way to the electronic state, however, the e-commerce process is governed by many determinants, including: economic determinants, legislative determinants, infrastructure determinants, cultural determinants and psychological determinants;
- Despite Algeria's recording of strengths within the e-commerce indicators, it ranks among the lagging countries electronically, due to several reasons, including the lack of trust of individuals in the virtual world and the lack of awareness of the importance of this trade;
- Algeria recorded weak points in almost all foreign trade indicators: the economic freedom index, the ratio of foreign trade to GDP index, the balance of trade and payments indicators, and the regulatory frameworks index, with the exception of the inflation and exchange rate, which have not been exploited so far;
- The volume of foreign trade in Algeria did not reach the required level, and this is due to the nature of the rentier economy and the confinement of export operations to the oil sector only, in addition to the excessive use of imports, which led to Algeria recording deficit levels in the trade balance almost throughout the study period.

**- Recommendations**

- Enact laws and information systems that facilitate the spread of e-commerce businesses, by developing a legal framework that enhances trust in the network economy through protecting consumers and securing communications from piracy and others;

- Increasing investment in the human resource in the field of information and communication technology;
- Providing digital infrastructure and deploying telecommunications services at the lowest cost;
- Developing the necessary payments system to carry out banking operations to complete electronic transactions.
- Identifying the real reasons behind the obstruction of foreign trade in Algeria and working seriously to diversify exports outside the hydrocarbon sector, especially in light of the successive fluctuations of oil prices, the last of which was at the end of 2014 and the beginning of 2015;
- Focusing on productive sectors such as agriculture and industry that can create an added value to the economy, the most important of which is reducing the import bill that has burdened the state budget;
- Working to direct economic reforms towards real productive investments by attracting foreign investors and encouraging them to invest in productive projects and gain experience, as it provides the concerned country with entering hard currency, thus increasing the state's foreign currency reserves.

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## 6. Appendices

### Annex number (1) : Data of E. Trade and Foreign Trade Indicators for period (2000-2018)

Trade balance	Regulatory frameworks	Economic freedom	Trade openness	Foreign trade ratio	Mobile phone subscriptions	Fix phone subscriptions	Years
966,7903	-0,71	56,8	56,93	62,8	0,28	5,55	2000
715,4736	-0,51	57,3	53,11	58,7	0,32	5,84	2001
544,1522	-0,58	61	54,35	61,1	1,41	5,98	2002
854,613	-0,52	57,7	56,16	62,1	4,48	6,3	2003
1023,048	-0,54	58,1	59,39	65,7	14,93	7,43	2004
1477,903	-0,38	53,2	70,95	71,2	41,21	7,57	2005
2297,334	-0,62	55,4	65,55	71,9	80,67	8,74	2006
2522,987	-0,79	56,2	69,42	76,6	77,83	8,59	2007
492,831	-1,07	56,6	62,22	71,3	92,63	7,08	2008
1321,779	-1,17	56,9	61,25	69,8	91,11	7,88	2009
1931,629	-1,19	52,4	60,44	67,4	97,15	8,1	2010
1780,2975	-1,28	51	59,19	65,4	100,38	5,54	2011
848,5514	-1,17	49,6	57,57	63,6	103,61	7,99	2012
197,8899	-1,28	50,8	55,89	62,1	111,24	7,76	2013
-1656,273	-1,17	48,9	52,62	59,7	108,81	8,04	2014
-2483,7	-1,17	50,1	55,93	56,2	116	8,24	2015
-1898,4	-1,2	46,5	55,32	65,8	110,77	8,5	2016
-1293,6	-1,26	44,7	57,9	62,6	121,93	8,7	2017
-1315,1	-1,3	46,2	52,03	63,5	130,52	4,15	2018

Reference: Different reports of International Bank, Algeria Bank, National Office of Statistics.

#### Continuation to Annex number (1)

Secured servers	Ration of phone subscriptions	Political stability	Balance of payments	Exchange rate	Inflation rate	Years
0	0	-1,43	16,72369	75,257	0,3	2000
0	0	-1,53	12,82277	77,26	4,2	2001
0	0	-1,63	7,67198	79,683	1,4	2002
0	0	-1,75	12,97893	77,3947	4,3	2003
0	0,23	-1,36	13,0269	72,0603	4	2004
4	0,09	-0,92	20,52361	73,3596	1,4	2005
3	0,09	-1,13	24,71475	72,6466	2,3	2006
3	0,17	-1,15	22,48796	69,3757	3,7	2007
6	0,23	-1,09	19,85624	64,583	4,9	2008
8	0,51	-1,2	0,3146	72,635	5,7	2009
18	0,53	-1,26	7,58047	74,391	3,9	2010
13	0,85	-1,36	8,83609	72,857	4,5	2011
18	0,92	-1,33	5,78424	77,55	8,9	2012
46	1,3	-1,2	0,56632	79,38	3,25	2013

68	1,56	-1,19	-4,33297	80,56	2,92	2014
94	1,96	-1,09	-16,28978	100,46	4,78	2015
152	2,53	-1,1	-16,37403	109,47	6,4	2016
309	3,59	-0,92	-13,17804	110,96	5,59	2017
2621	4	-0,83	-9,61483	116,62	4,27	2018

### Annex number (2): Deviation and Averages of E. Trade and Foreign Trade Indicators for period (2000-20018)

<i>Variables</i>	<i>Average</i>	<i>Criteria Deviation</i>
Indicator of political stability and absence of violence	(1,224)	0,239
Indicator of quality of regulatory frameworks	(0,924)	0,332
Indicator of economic freedom	53,255	4,348
Trade openness	59,068	5,348
Ratio of foreign trade to GDPPIB	14,848	4,960
Trade balance	537,433	1504,339
Inflation rate	3,933	1,961
Balance of payments as ratio to...	5,239	13,176
Ratio of internet users	1,143	1,412
Ratio of foreign trade to	65,489	5,290
Fix phone subscriptions (per 100 persons)	7,311	1,302
Mobile phone subscriptions (per 100 persons)	73,385	45,694
Secured servers	310,900	834,222

Reference: Results of program XL-Stat 19

### Annex number (3): Matrix of linkbetween variables E. Trade and Foreign Trade Indicators for period (2000-20018)

<i>Secured servers</i>	<i>Internet users</i>	<i>Political stability</i>	<i>Balance of payments</i>	<i>Exchange rate</i>	<i>Inflation rate %</i>	<i>Trade balance</i>	<i>Regulatory frameworks</i>	<i>Economic freedom</i>	<i>Trade openness</i>	<i>Ratio of foreign trade in</i>	<i>Mobile phone subscriptions</i>	<i>Fix phone subscriptions</i>	<i>Variables</i>
-0,230	0,043	0,476	-0,036	-0,062	0,200	0,031	-0,093	-0,177	0,457	0,337	0,357	1	<i>Fix phone subscriptions</i>
0,437	0,733	0,724	-0,652	0,543	0,425	-0,414	-0,870	-0,808	-0,050	0,065	1	0,357	<i>Mobile phone subscriptions</i>
-0,178	-0,345	0,276	0,585	-0,545	-0,021	0,674	0,205	0,251	0,870	1	0,065	0,337	<i>Ratio of foreign trade in</i>
-0,300	-0,465	0,286	0,664	-0,591	-0,046	0,680	0,382	0,284	1	0,870	-0,050	0,457	<i>Trade openness</i>
-0,631	-0,901	-0,730	0,727	-0,795	-0,254	0,633	0,737	1	0,284	0,251	-0,808	-0,177	<i>Economic freedom</i>
-0,408	-0,723	-0,424	0,778	-0,563	-0,448	0,503	1	0,737	0,382	0,205	-0,870	-0,093	<i>Regulatory frameworks</i>
-0,480	-0,799	-0,354	0,914	-0,908	-0,154	1	0,503	0,633	0,680	0,674	-0,414	0,031	<i>Trade balance</i>
-0,123	0,189	0,077	-0,351	0,124	1	-0,154	-0,448	-0,254	-0,046	-0,021	0,425	0,200	<i>Inflation rate %</i>
0,740	0,942	0,504	-0,838	1	0,124	-0,908	-0,563	-0,795	-0,591	-0,545	0,543	-0,062	<i>Exchange rate</i>
-0,441	-0,828	-0,377	1	-0,838	-0,351	0,914	0,778	0,727	0,664	0,585	-0,652	-0,036	<i>Balance of payments</i>
0,474	0,641	1	-0,377	0,504	0,077	-0,354	-0,424	-0,730	0,286	0,276	0,724	0,476	<i>Political stability</i>
0,784	1	0,641	-0,828	0,942	0,189	-0,799	-0,723	-0,901	-0,465	-0,345	0,733	0,043	<i>Internet users</i>
1	0,784	0,474	-0,441	0,740	-0,123	-0,480	-0,408	-0,631	-0,300	-0,178	0,437	-0,230	<i>Secured servers</i>