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# Business developments in electronic commerce in Romania, a prerequisite for sustainable growth

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**Abstract.** *In recent years, at the European level, electronic sales have gained major importance in the whole commodity trading process. After 1994, for the first time, commercial websites appeared, which brought about the expansion of electronic commerce. Therefore today, the notion of the market has become a global network as a result of improved payment systems, cost reduction, after-sales service development, and significant direct marketing influence.Therefore, a concerted effort is needed at national level to increase information and knowledge resources, including by allocating additional funds to the IT infrastructure, as well as by educating and training the population in the field of informatics. In this paper, we focused on the description of electronic commerce trends in Romania, based on the secondary data provided by the National Institute of Statistics. Thus, the main purpose of this paper is to make a comparative study of the different statistical techniques: the graph method, the structural modification method, as well as the regression and correlation methods (ANOVA), used to describe the new trends of the Romanian commercial technologies. The main conclusion of the paper was that there is a significant correlation between the macroeconomic indicators that characterize the electronic commerce in Romania. Thus, the evolution of the average number of employees in the ICT sector as the resultant variable is influenced at the level of Romania by the macroeconomic indicators that characterize the electronic commerce as the component of the IT market.*

**Keywords**: electronic commerce, information and communication technology, sustainable growth, the method of regression and correlation, commercial technologies.

## Introduction on electronic commerce

At present, the computer is a communication tool. It integrated into people's lives, having changed, from a mathematical computing tool, into an essential device for human activity.

According to Wikipedia, e-commerce is defined as a purchase or sale step by means of remote data transmission, specifically addressing the expansive marketing policy of commercial companies. (Http://en.wikipedia.org/wiki/Comer%C8%9B_electronic) Another specific feature of electronic commerce is the development of business-specific activities in an integrated

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automated system for the exchange of information through the use of computer networks.

As far as electronic commerce is concerned, companies had to take into account a number of particular features of online marketing. Thus, they had to become aware of the importance of thorough customer survey, corporate culture, perceived commodity, competition, communication, consistency, creative content, personalization, coordination and activity control. These elements are very important at the level of marketing activity, as they highly complement the mix of online marketing strategies (Gay, et al. 2007).



In addition, the IT system must have the capability to provide users with: products, physical or digital services and ideas demanded by buyers (Fletcher, et al. 2004). Electronic commerce sites can be hosted on a system that belongs to the client, but there is also the possibility to rent space on the servers of the Internet service providers. Software testing is the process of looking for bugs in the program, no matter if errors are caused by logical or physical issues. It is considered an important part of software quality. At the same time, it is necessary to consider the stage of site promotion, as well as the stage of its administration and maintenance. (Mârşanu, 2012)
What is to be considered in an e-commerce system is a balance between information, entertainment and sales, thus providing a complete communication package.
As far as the World Wide Web (WWW) service is concerned, it strikes a perfect balance between the visual impact and the graphical and textual information it provides. That's why e-commerce systems are based on a powerful web architecture in terms of reliability, flexibility, and so on. A web-based architecture (Mârsanu, 2012) is presented schematically as follows (Figure 1):

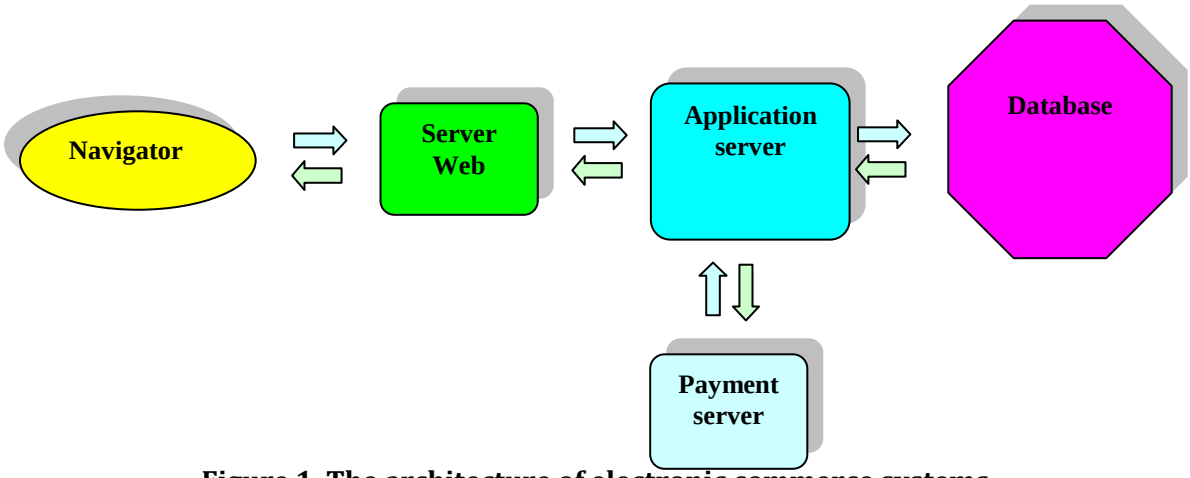


**Figure 1. The architecture of electronic commerce systems**
Source: Mârşanu, R - The Architecture of an Electronic Commerce System, Tribuna Economică, No.8, 2012 pg.24.

Also, an e-commerce system should take into account the following strategies: a strategy for promoting products and the e-commerce system, a strategy for ways and means of making payments for products and services, and a strategy for with regard to the external aspect of the e-commerce system by proposing a customer interface.
In this context, it is necessary to take into account the stage of promoting a site as well as the stage of its administration and maintenance.

Other connections established through the Internet network, which is tangential to electronic commerce, are: government to government (G2G), falling within the electronic governing sphere; government to business (G2B), entails the use of the Internet by public institutions to purchase goods and services; government to consumer (G2C) used for: welfare, child state allowances, etc.; consumer to business (C2B) is the communication of end users with the business environment, while consumer to consumer (C2C), involves communication and exchange of data and objects between private individuals. The way in which firms (companies), government (administration) and consumers interact in electronic commerce activities are summarized in Table 1.



**Table 1 - The relations established over the Internet**

| | Government-G | Companies-B | Consumers-C |
|---|---|---|---|
| Government-G | G2G<br>Coordination | G2B<br>Information | G2C<br>Information |
| Enterprises-B | B2G<br>Administration, logistics | B2B<br>Electronic commerce | B2C<br>Electronic commerce |
| Consumer-C | C2G<br>Online fee payment | C2B<br>Price comparison | C2C<br>Online auctions |

Source: Mârşanu, R, Stages in Electronic Commerce, Tribuna Economică, No.1, 2012,p.24

Among the advantages of electronic commerce, if compared to classic commerce, one can list: access to products and services provided by producers and suppliers; easy access to market research on price, quality, delivery dates, product components; lower business costs (reduced monthly investment - web hosting and possibly the rental for the software program plus the Internet connection); virtual stores do not need stocks, are open 24 hours a day, there are no vendors and can be accessed from anywhere, by anyone; the ability of small businesses to compete with large ones, due to the low cost of opening a virtual store; the ability of local and foreign companies to cooperate, etc.(Bucur,2002)

With all these advantages, we have to emphasize that e-commerce compared to the classic one has a number of disadvantages, such as: data security, lack of human contact, unequal access to this technology, etc. are not ensured. At the same time, at the level of the countries of the Union The European Union has highlighted a number of negative aspects of the use of e-commerce by SMEs, namely: distrust of Internet contract security, technical inability to use this technique, acquisition of IT equipment would not be profitable, incapacity to use the Internet by the potential clients, etc. The main objective of the research was to present by simple statistical methods the evolution of the macroeconomic indicators characterizing the ICT sector. At the same time, in the work with complex analysis methods (ANOVA), it was followed
if there is a dependence between indicators characterizing the ICT sector, in order to increase competitiveness, qualification and specialization.

## Literature review

In the last decade, the deployment of broadband technologies has been and is still considered a key indicator for ICT policymaking. These technologies offer users the ability to quickly transfer large volumes of data and maintain open access lines.

Broadband is defined by the type of connection that provides broadband access: xDSL (ADSL, SDSL, etc.), cable TV network (cable modem), UMTS (mobile phone), or others such as wireless fixed wireless network . (National Institute of Statistics, 2009)

Also, according to the National Institute of Statistics, the investments and expenditures for information technology products and services comprise the total expenses for the purchase of equipment and hardware, peripherals, software, maintenance, repair, and IT consulting activities. Generalized broadband access to the internet is considered essential for the development of advanced internet services, such as electronic commerce, e-government or on-line training. Digital Subscriber Lines (DSL) remains the main form of distribution for broadband technologies, although alternatives such as cable, satellites, fiber optics, and wireless local loops are becoming more common. The European Commission adopted in May 2010 a strategy aimed at creating a thriving digital economy by 2020.

The strategy defines those policies and actions meant to extend the benefits of the digital age to all sectors of society and economy. The agenda focuses on seven priority areas for action: developing a digital single market, increased interoperability, boosting internet trust and security, providing faster internet access, encouraging investments in research and development, improving skills and inclusion related to digital literacy, as well as the use of ICT to address the challenges facing our society, such as climate change and the aging of the population.

The Chamber of Commerce and Industry of Romania and of Bucharest is also directly interested in the development of electronic commerce in Romania, having opened a dedicated electronic commerce department. They also developed numerous programs to support economic agents in this field of activity, such as: providing commercial information via the Internet; the WINNER Program, on the involvement of businesswomen in electronic commerce; the pilot project for a digital market; the opening of a Pledge Register on the Internet; the exchange of electronic documents, with the Financial Administrations within the Bucharest Trade Register office, for the registration of commercial companies.

The Strategy also sets the following indicators for Romania to reach by 2020: at least 35% of our citizens will use e-Government systems; at least 60% of our citizens will use the Internet regularly; at least 30% of our citizens will make on-line purchases; broadband communication networks (over 30 Mbps) will cover more than 80% of the country (http://eur-lex.europa.eu/legal-content).

State involvement in electronic commerce has become more and more visible lately, especially given the actions of the Ministry of Communications and Information Technology, in line with the Europe 2020 Strategy, such as: the e-auction tender project, granting e-banking licenses and involving all public institutions in the e-Government program.(http://www.gpec.ro/blog/bilant-electronic commerce-romania-2015)

In the end, a sustainable growth entails building a competitive, sustainable and resource-efficient economy that takes advantage of Europe's leading role in the race for the development of new processes and technologies, including green technologies. All these are meant to accelerate the development of smart networks that envisage ICT for a better use of EU networks and for strengthening the competitive advantage of our business environment, especially in the manufacturing and SME sectors, as well as to help consumers understand the merits of an efficient use of resources. (http://eur-lex.europa.eu/legal-content)

Among the most common purposes for which the Internet was accessed in 2012, most are communication-related, especially correspondence by e-mail and posting messages on chats, blogs and real time messages (National Institute of Statistics, 2012).

In 2013, the number of Internet users increased by about one million people, reaching a total of 9.6 million people, aged 16 to 74.

According to the latest data we have, Romania currently has approximately 19.8 million inhabitants, 13 million of which are aged 16 to 55. Approximately 11 million are Internet users, compared to December 2014, when the number of Internet users was of approx. 10 million. Thus, the Internet penetration rate increased from 49.76% at the end of 2014, to approx. 56% at the end of 2015. Most of them still prefer to use desktop computers when buying online, but mobile use increased significantly in 2015. This trend is growing this year, as well. Thus, in the last months of 2015, over 50% of the traffic in large online stores was generated by mobile devices. However, Visa officials say the number of online transactions, made with Visa cards in online stores, increased by 20-25% in 2015, compared to 2014. The figures provided by Visa show that Romanians spend more in online stores from abroad than in the domestic market. The value of the average transaction amounts to 58 Euro in stores from abroad and to 40 Euro in online stores in Romania.

The main benefits and services that Romanians wish for in online stores are, in turn: free shipping, promotions and discounts, the cost of shipping to also be borne by the online store in case of return (even if the legislation in force stipulates that it is the buyer's task), and delivery of purchased products as quickly as possible (http://www.gpec.ro/blog/bilant-electronic commerce-romania-2015).

Romania ranks fourth among the European countries with the largest increase in online commerce, with a 24% increase in sales in 2015, reaching 1.49 billion Euros, according to the E-commerce Europe survey. Nevertheless, in Romania, only 1.9 million inhabitants buy online, namely 11% of the country's population. In 2016, according to the quoted study, the estimated growth of online sales is 19.9%, by comparison to 2015, having reached 1.78 billion euros. (https://www.ecommerce-europe.eu/)

"Mobile" was the trend of 2016, but this is also true for 2017. Romanian online stores understood this and optimized their websites for mobile devices. However, the main challenge remains the optimization of the mobile theme in terms of size and the number of called scripts, so that loading times are as short as possible.

The increase in wages, the decrease in VAT and, implicitly, the lower prices contributed to the increase of consumption in the Romanian economy, in 2016. This was reflected in the online trade, as well. In 2016, about 64% of the value of Visa online payments went to international online shops, as Romanians spent their money on airline companies (airline tickets), travel agencies and hotels for holidays and travels, but also on websites with adult content or online casinos.

In 2017, sales of these product categories are expected to continue to grow, as well as on car parts and DIY sites, according to the Romanian Online Shops Association (ARMO). In 2017, a 24% increase in online sales in Romania is expected to exceed 2.5 billion Euros, given the growing number of customers, of online shops and of the available products.

## Research methodology

The process of knowledge of business evolution in the field of electronic commerce in Romania aimed at organizing and going through distinct and successive stages that included data observation or data collection, systematization and processing, analysis and interpretation of the results and formulation of the conclusions. The collection and presentation of the data was done in the paper on the basis of statistical data published by the National Institute of Statistics in order to detach the dependencies between the indicators that characterize e-commerce. The processing and modeling of the statistical data regarding the electronic commerce in Romania, based on the secondary data,

(ANOVA) between the macroeconomic indicators characterizing the e-commerce trends in Romania during the period 2009-2016, for example: The average number of employees in the ICT sector, real GDP in the sector ICT and real ICT investments.

At the same time, using the multiple regression method to study the correlation between the indicators. At the same time, the use of the multiple regression method to study the correlation between the indicators characterizing the e-commerce trends in Romania in the period 2009-2016 took into account an estimation of the regression function parameters, realized through linear modeling with the Excel database management and analysis program.



The econometric analysis considered the following aspects: determination and interpretation of the correlation level and its intensity, identification of the function of the data for the analyzed period, validation of the significance of the obtained model, etc. (Cristache, et al., 2011)

The analysis of the validity of the linear multifactorial econometric model was carried out by the Fisher-Snedecor test (R. Fisher, G. W Snedecor, 1920). The Fisher test was determined on the basis of the ANOVA variance analysis characterizes trends of electronic commerce in Romania during the period 2009-2016 considered an estimation of regression function parameters, achieved by linear modeling with the Excel database management and analysis program. The econometric analysis considered the following aspects: determination and interpretation of the correlation level and its intensity, identification of the function of the data for the analyzed period, validation of the significance of the obtained model, etc. (Cristache, et al., 2011). The analysis of the validity of the linear multifactorial econometric model was carried out by the Fisher-Snedecor test (R. Fisher, G. W Snedecor, 1920). The Fisher test was determined on the basis of the ANOVA variance analysis

## Results derived from secondary data on the evolution of e-commerce

Fluctuations in the development of the information and communications technology can be highlighted by means of the main quantification indicators, such as: turnover of enterprises, number of enterprises, average number of employees, made investments, real gross domestic product, etc.

The Chart of Development (see Figure 2): Development of Key Indicators of the ICT Segment highlights the following issues, namely:

- The average number of employees in the ICT segment increased from one year to another in the period 2009-2016, from a minimum of 112.3 thousand persons in 2009, to a maximum of 161.8 thousand persons in 2016 (i.e. an annual average increase of 5.35%).

The real investments in the information and communication technology sector show the same positive evolution in 2009-2016. The average investment level in the ICT sector was 1503.12 million euro / year in 2009-2016. In dynamics for the period 2009-2016 there is an average growth of real investments in this field of 1.13 times with an average growth rate of 13.76%. We can appreciate that this positive evolution of the real investments in the ICT sector was due to mainly to diversify the range of soft and hard products, to modernize them

- The development of real GDP in the information and communications technology segment displays an overall upward trend in the period 2009-2016, except for 2010. A significant decrease of 374 million Euros occurred in 2010 as a result of the financial crisis. Its effects were felt in all areas of activity, including the IT market. Between 2011

and 2016, one can see a certain recovery of the real GDP in this segment, due to the relaxation of the international financial markets and the policies and strategies of the European Union. As far as the dynamics are concerned, compared to 2009, we witnessed a growth of the real GDP by 1,085 times in 2016, i.e. a growth rate of 8.5%. However, foreign businessmen, especially Europeans, were sufficiently willing to invest in the Romanian economy because of the political, economic and social instability that persists in our country, as well as because of the improper infrastructure and ambiguous fiscal policy.



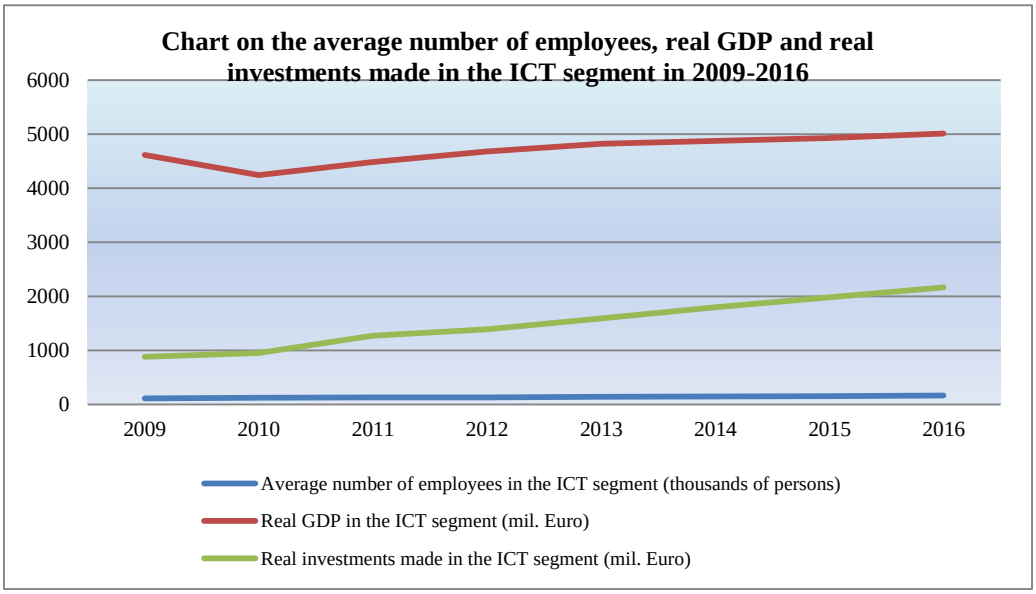


**Figure 2. Development of macroeconomic indicators that describe the ICT segment.**
Source: The Information Society, Statistical Information, Business Statistics Series, 2009-2015, the National Institute of Statistics, p.5
Note: The values for 2016 are estimated

Given the evolution of the average number of employees in the ICT sector over the period 2009-2016, depending on the causal variables: real GDP in ICT sector and real investment in ICT sector, the following results of the multiple linear regression function were obtained. (see Table 2)

$$\hat{y}_{x_1,x_2,} = 125.19 + 0.04x_1 - 0.01x_2$$

At the same time, by applying a multiple linear regression model using the Excel program package, the following results were obtained in Table 2:

**Table 2. The multiple correlations between the average number of employees in the ICT segment, the resultant variable and the development of real GDP, real investments in the ICT segment as factorial variables**

| Regression Statistics | | | | |
|---|---|---|---|---|
| Multiple R | 0.99 | | | |
| R Square | 0.98 | | | |
| Adjusted R Square | 0.97 | | | |
| Standard Error | 1.29 | | | |
| Obs. | 8 | | | |
| | Coeff. | P-value | Lower 95% | Upper 95% |
| Intercept. | 125.19 | 0.00 | 83.59 | 166.80 |
| Real investment in the ICT sector (millions of Euro) | 0.04 | 0.00 | 0.04 | 0.05 |

| | | | | |
|---|---|---|---|---|
| Real GDP in the ICT sector (millions of Euro) | -0.01 | 0.04 | -0.02 | 0.00 |

Source: Authors' own research



The determination coefficient shows that 98% of the variation in the average number of employees in the ICT segment is explained by the influence of the following variables: real GDP and real investments in the ICT sector. The same is true in the case of Adjusted R Square, but it takes into consideration the number of degrees of freedom. In conclusion, the multiple relations are linear and very strong. The positive correlation indicates that the connection is direct and significant.

Coefficient B1 (the slope) is 0.04, which means that, given an increase of real net investments in the ICT segment by one million Euro, the average number of employees in the ICT segment will grow, on average, by 0.04 thousand people. Since the p-value = 0.00 <0.05 it means that the coefficient is valid for a significance level of 0.05 (Table 2).

Coefficient B2 (the slope) is -0.01, which means that, given an increase of the real GDP in the ICT segment by one million Euros, i.e. by one unit of measurement, the average number of employees in the ICT segment will decrease, on average, by 0.01 thousand people. Since the p-value = 0.036 < 0.05 it means that this coefficient, as well, is valid for a significance level of 0.05.

After noticing the graphical representation (see Figure 3) of the connection between real GDP, real investments in the ICT segment, as independent variables, and the average number of employees, as dependent variable, one can make a hypothesis according to which there is a direct and linear connection between variables; while independent variables display an upward trend (real GDP and real investments), the dependent variable (number of employees) also displays an upward trend. Points are evenly distributed along the regression line, in particular in Figure 3 b.

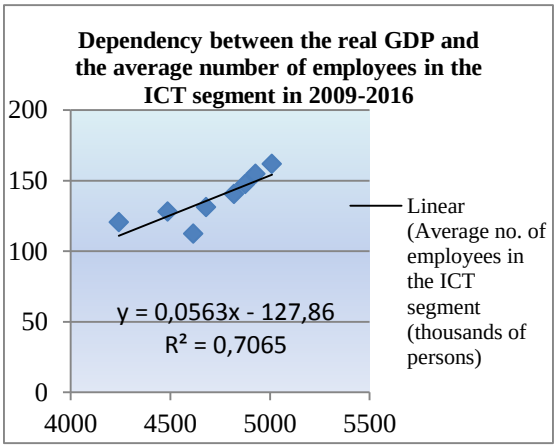


**Figure 3a. The graph of correlation between GDP and average number of employees**

Source: Authors' own research

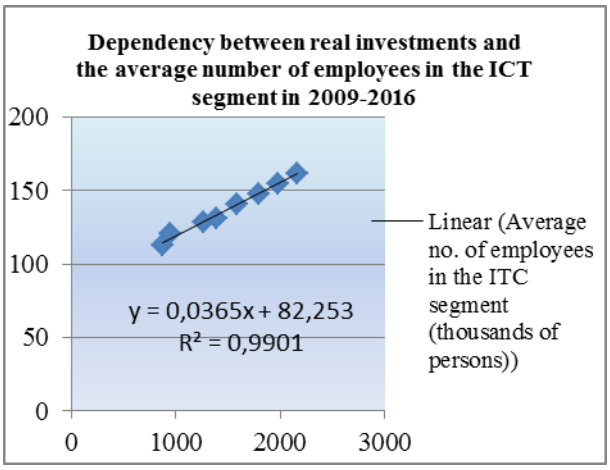


**Figure 3b. The graph of correlation between investments and the average number of employees**

Source: Authors' own research

In conclusion, the correlation graphs 3.a and 3.b indicate a linear and direct link between the correlated variables. We also appreciate that the independent variables included in the multiple linear regression model (real GDP in the ICT sector and the real ICT investments) have a significant and positive influence on the variance of the dependent variable (Average number of employees in the ICT sector). Investments have a 99% change in the number of employees, while the GDP is only about 71%

## Conclusions

In recent years, due to the increase in computerization of both businesses and the population, electronic sales have practically become a way of life. However, there are still significant gaps in e-commerce (number of Internet subscribers, number of users internet, number of telephone lines, etc.) between urban and rural areas. This is because the big companies operate mainly in the urban environment, mainly because of their size and the rich range of products offered. The poorly developed infrastructure along with unsatisfactory education in some rural areas in our country are some of the causes of this discrepancy in regarding the state of informatisation.

The economic results of these firms depend to a significant extent on the country's macroeconomic results, on the stable correlations there should be between the labor market, the educational system and the level of development of the research / innovation activity in the field of information technology and telecommunications. That is why the macroeconomic outcomes, in their evolution, give us the strongest argument on a country's ability to develop rapidly and sustainably, to create added value, in conclusion to ensure the economic and social development of a country. Obtaining results positive macroeconomic developments by our country in the next period will lead to an increase in the number of employees working in the ICT sector, which will result in a decrease in unemployment and an increase in the standard of living of the population. For this, however, an important factor to be considered is also the change in the lifestyle of the population due to the exponential growth of the Internet

Also, the advantage of online commerce is obvious: the Internet market grows exponentially from one year to the next. A well-known, proper site that offers high-quality products at good prices will have more visitors, who are also better motivated and have more money to spend. The main conclusion of this paper is that the switch from classical trade to electronic commerce has to be carried out gradually, without eliminating certain stages. It is in vain that we have the latest technology in the field if

there is not enough qualified staffs who know how to use specialized e-commerce sites. Therefore, the first measure that should be adopted in any country, including Romania, is to ensure Internet access of as many people as possible. (Voinegu, et al. 2016)

Finally, in order to improve the work, the authors propose in the future to extend the analysis period in order to capture as accurately as possible and complex the evolution of this sector of activity, as well as the introduction in the paper of other factorial variables such as: expenditures for products and services ICT, turnover in software publishing and information technology services, share of businesses that own the website, etc.



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