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Factors Affecting Internet Users: A Comparative Investigation between Romania and Turkey

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Abstract *The main research aims to highlight differences in the number of Internet users in Romania compared to Turkey in the period 1993-2016. For a better understanding of the topics studied in the mirror was present evolution of the number of total population of the two countries. Data for the analysis were taken from the National Institute of Statistics recording in the two countries Hypothesis testing and data analysis was performed using ANOVA and descriptive statistics. The research results reveal that although in the period 1993-2016 averages on the population growth in the two countries were very different however averages for the number of Internet users remained equal. At the end of 2016, Turkey had a total population of 3.4 times higher; whereas Romania had 1.04 times more Internet users.*

Key words Internet users, total population, Romania, Turkey, ANOVA

JEL Codes: M31, M37

1. Introduction

Currently almost half the world's population has Internet access, according to recent studies conducted by the International Telecommunications Union in the UN. In developed countries the percentage of population with Internet access reached 80%, while in developing states the percentage was about 45% and 15% in poor countries. Although there is a strong gap between developed and less developed countries, many companies are interested in developing new projects and provide Internet in these disadvantaged and less accessible areas of the world. In March 2017, the percentage of people in Europe who have Internet access reached 17.1%, while in Asia the figure was 50.2% (<http://www.internetworldstats.com/stats.htm>).

1.1. Evolution and access to Internet

Internet origin of the term comes from combining the two words Interconnected and network. Internet implied a mobile network of interconnected computers according to rules Transmission Control communication protocols and Internet Protocol, known as TCP/IP. ARPAnet was the name of the first network of interconnected computers in 1965 under the authority of Advanced Research Projects Agency Defense of the US Department of Defense.

Today Internet is nothing more than the extension of the network Arpanet permanently. Unique in the world, the Internet today offers users a variety of opportunities such as: the provision of data and information users need, purchase of consumer goods and services at favorable prices, the discovery of holiday offers for all tastes and all pockets, opportunity of booking online -line for tickets, insurance, transfers, development of financial and banking transactions etc. All this information and services are offered for a fee or free.

Internet access can be achieved by several methods: through fixed telephone line, the router (ADSL Modem) using wired or wireless based on techniques Wi-Fi or WLAN through communications controller dedicated by cellular network (GSM) network cable satellite TV. These different technologies are developed, such infrastructure in areas developed using methods router, and cell phone in areas isolated by the cable TV network or satellite (ro.wikipedia.org).

Number of web sites has increased from 186.7 millions in 2008 to over 1.2 billion in 2016. Today, with a browser you can use a variety of web applications. These Internet applications have become over time more varied: email, chat, video, video on demand, electronic voting, e-commerce, internet banking, Internet television, environment for print, medium to promote health, education, tourism, environment for communication between different groups, the environment for the development of interactive gaming environment for virtual visits around the globe, environmental images and music promotion, marketing and business environment in almost all fields etc. (www.romanalibera.ro).

The latest appearance of the Internet are Web 2.0 and Web 3.0, allowing users actively involving less trained to rollout and that allow cars to collect information on the multimedia application and integrative World Wide Web. (www.adevarul.ro).

Internet hosts today many providers on the web (web hosting) for various active communication actions or projects online. It should also be remembered that the Internet does not enjoy a full and free use in all states, being censored in some countries especially in the areas of religion, pornography, jobs, political, security, etc. (www.evz.ro). However the Internet continues to expand rapidly throughout the world earning an average 2% of new users per year. They will access the Internet on tablets, laptop, and sites and especially on mobile. Increasing the number of Internet users will generate changes in terms of activities carried out on-line. Most owners of smart phones will make banking transactions and trade

directly on these devices; they will stream music and seek holidays, health care and job direct URLs will correspond directly by mailing or do time (www.economie.hotnews.ro).

If by March 2017, using the Internet mobile data traffic in most countries was achieved through 4G networks in the coming years experts confirms that traffic will increase eight times and the flow of mobile networks will be developed on the basis of new connections mesh 5G (www.romanialibera.ro).

This study has two objectives:

- To evaluate the evaluation of the number of population in the two countries - Romania and Turkey, in the period 1960-2016, using ANOVA;
- To assess the development of Internet users in the two countries - Turkey and Romania, during 1990-2016, using ANOVA.

The following hypotheses were tested:

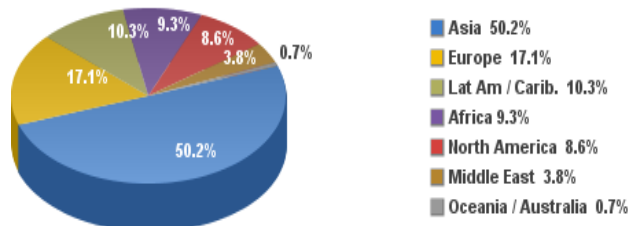
H_1 : There is no significance difference on total population among the two countries;

H_2 : There is no significance means difference on user internet among the two countries.

2. Literature review

The number of Internet users is constantly growing in all regions of the world. The highest percentage of Internet users was registered on March 25, 2017 in Asia - 50.2% and 17.1% in Europe. At the opposite pole Oceania and Australia where it recorded the lowest percentage of Internet users (www.internetworldstats.com).

**Internet Users in the World
by Regions - March 25, 2017**



Source: Internet World Stats - www.internetworldstats.com/stats.htm

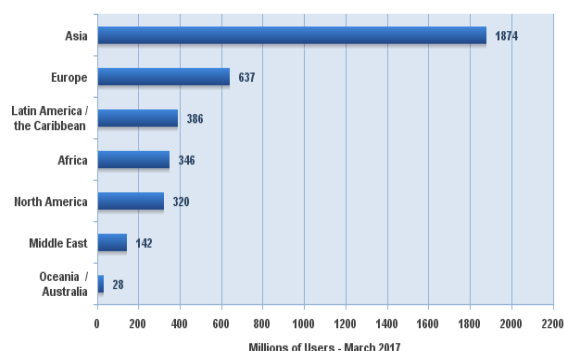
Basis: 3,731,973,423 Internet users on March 31, 2017

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Source: <http://www.internetworldstats.com/images/world2017pie.png>

Figure 1. Internet users in the world by regions

**Internet Users in the World
by Geographic Regions - March 25, 2017**



Source: Internet World Stats - www.internetworldstats.com/stats.htm

Basis: 3,731,973,423 Internet users estimated for March 31, 2017

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Source: <http://www.internetworldstats.com/images/world2017pie.png>

Figure 2. Internet users in the world by Geographic regions

In Asia were registered 1.874 billion Internet users in the total population consists of 4.148 billion people, resulting in a penetration rate of 45.2% and an increase of 1,539.4% during 2000-2017.

In the same period 2000-2017, in Europe the total population of 823 million inhabitants were registered 637 million Internet users, resulting in a penetration rate of 77.4% and an increase of 506.1% (www.internetworldstats.com).

In recent years, they have been made and continue to be studied and prepared statistics on population and thus increase the number of Internet users by numerous international NGOs, United Nations, IWS and many specialists as: Young K.S.(1998), Sanjeev (2008), Shaw and Back (2008), Aboujaoude (2010), Kressmann (2017).

3. Methodology of research

Through this study it is tried comparative analysis of Internet users in both countries Turkey and Romania for the period 1993-2016. In this quantitative study, descriptive statistics and analysis of variance were used (ANOVA). Internet users list included people aged over 18 years in Turkey and Romania, respectively, which use communication services during 1993-2016. Secondary data and information necessary to achieve this quantitative study were taken from the National Institute of Statistics of Romania (ISSN), after being selected and processed in order to achieve the analysis.

Highlighting the comparative evolution of Internet users in the two countries in the period 1993-2016, it was carried out using two methods: a descriptive analysis research variables and analysis of variance (ANOVA). On the basis of data from tables ANOVA statistical significance was tested by one independent variable influence "land" on the dependent variable "total population" recorded in the period 1993-2016 and that the dependent variable "yearly average Internet users"

recorded during 1990-2016. By hypothesis testing using ANOVA analysis aims to identify differences between the total population and the respective annual averages of Internet users registered in Turkey and Romania in the period.

Research hypotheses are: $H_0: \bar{Y}_1 = \bar{Y}_2$ and $H_1: \bar{Y}_1 \neq \bar{Y}_2$

Where:

\bar{Y}_1 is total population/the means on user internet in Turkey, \bar{Y}_2 is total population/the means on user internet in Romania.

Table 1. ANOVA Summary Table

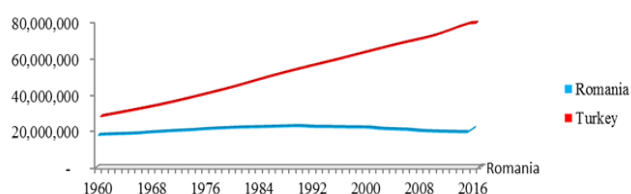
Source of variation	Sum of squares	Degrees of freedom (df)	Mean squares	F obt.
Between Groups (SS group)	SS between levels: $\sum_{j=1}^c n_j (\bar{y}_j - \bar{y})^2$	$c-1$	MS group = $\frac{\sum_{j=1}^c n_j (\bar{y}_j - \bar{y})^2}{c-1}$	F obt. = $\frac{MS \text{ group}}{MS \text{ error}}$
Within Groups (Error)	SS in levels: $\sum_{i=1}^{n_j} \sum_{j=1}^c (y_{ij} - \bar{y}_j)^2$	$n-c$	MS error = $\frac{\sum_{i=1}^{n_j} \sum_{j=1}^c (y_{ij} - \bar{y}_j)^2}{n-c}$	
Total	SST: $\sum_{i=1}^{n_j} \sum_{j=1}^c (y_{ij} - \bar{y})^2$	$n-1$	—————	

Study proves its originality by making a comparative analysis between Turkey and Romania on the similarities and differences between the population and the share of Internet users for a fixed period and by researching dependence relations of the two variables in relation to the place of origin of users using the ANOVA (see table 1).

4. Data analysis

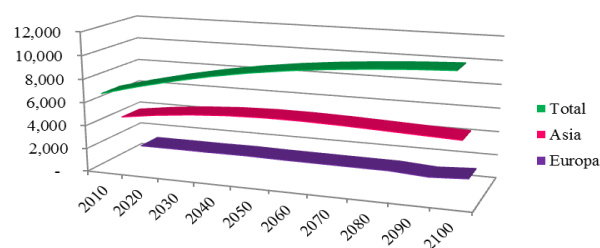
To give a better picture of the evolution of Internet users in the two countries - Turkey and Romania, in the first stage, it was introduced evolutions of total population of the two countries during 1960-2016.

As they will be seen in Figure 1 since 1960 the total population of Turkey increased from 27.55328 million people to 78,985,678 people in 2016. At the end of 1992 the total population of Turkey had doubled (55,811,134 people) and it estimates that by the end of 2020 it will triple. This demographic explosion took place amid increasing living standards; improve the level of health services and public education, which allowed an increase in the birth rate - the number of newborns in every family and life expectancy. Turkey is part of the emerging economies that have a highly developed industrial and technological potential. However, population growth was between 2.05 - 2.45%/year over the period 1960-1984 as a result of carrying out economic reforms, liberalizing trade in goods, services and transactions in the financial market and industrialization of main cities of the country especially those western - Istanbul, Bursa, Edirne, Eskisehir, Izmir, Bodrum and Turkey's central Konya, Kayseri and Gaziantep. As a consequence of the financial and economic crisis of 1970, 1996, 2001 and 2010 and the implementation of economic reforms, realization of massive foreign investment and increasing share of foreign trade in the period 1985-2016 population growth continues at a slower pace an average of more than 1.56%/year.



Source: Made by author

Figure 3. The Trend of Total Population in Turkey and Romania during 1960-2016



Source: Made by author

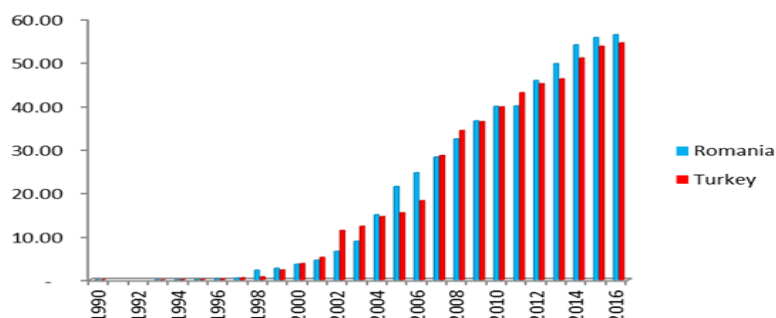
Figure 4. The projection of the earth people to 2100

In Romania, the last census of 2011 indicates a population of 20.14 million inhabitants and a downward trend by registering a negative natural increase. At the end of 2016, the population of Romania reached 19.90 million people and continues to decline. According to experts from the National Institute of Statistics, the main causes are: strong population migration in search of a better lifestyle, maintaining negative natural growth continuous registering a number of deaths exceeds the number of live births and infant mortality.

According to estimates provided by the UN Population average in 2012¹ the total number of people living on Earth did increase by 48.20 % from 7324 millions people in 2015 to 10.854 in 2100.

If total population of Asian countries will continue to grow from 4,485 in 2017 to 4.712 in 2100, at European countries, the population will continue to decline reaching in 2100-639 millions of people from 743 millions in 2017.

In Romania the share of Internet users has grown rapidly from year to year, reaching 39.93% of users in 2010 and 56.43% in 2016.



Source: Made by author

Figure 3. The Trend of Internet user in Turkey and Romania during 1990-2016

In Turkey, the share of Internet users grew as fast as in Romania, reaching 42.13% of users in 2010 and rising to 52.40% in 2016. At the end of 2016, the percentage of Turkish people aged 17-74 who used the computer and the internet was 46.9% and that of the mobile internet users 73.1%. Men use the computer and the Internet 63.2% while women use 45.9% (Young, 1996). If during 1994-2005 people got into contact with the internet via their desktop or office computer after 2006 with the emergence of ultra-performing laptops, tablets and smartphones and easily accessible by costs created the premises for the majority Users have the first online experience on these portable devices that are increasingly being used on average. Concurrently, new activities have been developed by people with mobile devices, so most Internet users now benefit from Internet services Banking, music streaming, access to job sites, travel services to acquire goods and services of any kind or to consult at any time of day e-mail with the help of internet from mobile.

It is currently seen that most people are making more and more purchases using mobile phones and less laptops, whether books, music, clothing, games or other applications (Young, 1996).

5. Results

Analysis of descriptive statistics indicate that the average total population in Turkey was the reporting period, 52.04 million people, more than double compared to the average total population in Romania was only 21.28 million people.

Table 2. Descriptive Statistic -Total Population in Turkey and Romania during 1960-2016

	Mean	Standard Error	Median	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
Romania	21,286,711	186876.2	21,551,634	1410884.097	1.9906E+12	(1.03)	(0.45)	4,794,930	18,406,905	23,201,835	1,213,342,541	57
Turkey	52,048,151	2059286	52,126,497	15547266.12	2.4172E+14	(1.23)	0.07	51,432,398	27,553,280	78,985,678	2,966,744,630	57

Source: Made by author

In 1990, Romania recorded an average maximum total population of 23.20 million. This average was recorded as minimum in Turkey at the end of 1960 (27.55 million people). Also in Turkey, the highest average total population was recorded in 2016 when the total population reached 78.98 million people. Amplitude obtained during 1960-2016, the total population of

¹ World Population Prospects: The 2012 Revision" (XLS). Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. 1 June 2013. Available to 29 march 2017.

Romania was 4.79 million people compared with 51.43 million people registered in Turkey, amplitude calculated as the difference between the maximum and minimum average total population.

Table 3. Descriptive Statistic –Number of total population in Turkey and Romania during 1960-2016

	Mean	Standard Error	Median	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
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Turkey	52,048,151	2059286	52,126,497	15547266.12	2.41717E+14	(1.23)	0.07	51,432,398	27,553,280	78,985,678	2,966,744,630	57

Source: Made by author

Asymmetry index (Skewness) calculated for the total population had a positive value of 0.07 in Turkey indicating a slight asymmetry to the right. Skewness same index calculated for the total population of Romania was -0.45, indicating an asymmetry to the left that deviates slightly from the normal distribution form.

Vaulting indicators (Kurtosis) for the total population in Turkey and Romania have negative values of -1.03 and -1.23 respectively showing a platykurtic distribution.

The study shows that the average proportion of Internet users in Turkey was 21.75%, slightly lower than the 22.07% recorded in Romania. At the end of 2016 Romania and Turkey recorded the highest shares on Internet users 56.43% and 54.52%.

Table 4. Descriptive Statistic –Internet Users in Turkey and Romania during 1993-2016

	Mean	Standard Error	Median	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Minimum	Maximum	Sum	Count
Romania	22.07	4.25	18.25	20.81	433.08	(1.43)	0.40	56.43	0.00	56.43	529.68	24.00
Turkey	21.57	4.12	15.02	20.17	406.67	(1.50)	0.39	54.51	0.01	54.52	517.71	24.00

Source: Made by author

Given the large share of Internet users in Turkey, Romania notes that indicators vaulting (Kurtosis) calculated were negative of -1.50 and -1.43 respectively showing a strong platykurtic distribution. However Skewness indices were positive and almost equal 0.39 and 0.40 in Turkey in Romania, developing a slightly positive right asymmetry. Analysis of variance (ANOVA) for the dependent variables - total population and the percentage of Internet users have been shown in Tables 5 and 6. If the total population size $F_{calc} = 221.32$ (Levene's Test) It is greater than the critical value $F_{0.05, 1, 112} = 3.93$ therefore accept the alternative hypothesis is that the total population obtained in the two countries are significantly different.

Table 5. ANOVA – The total population

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.69686E+16	1	2.69686E+16	221.32	0.000	3.93
Within Groups	1.36477E+16	112	1.21854E+14			
Total	4.06162E+16	113				

Source: Made by author

Analyzing minimum level of significance P-value (0.000) in Table 4 it is observed that it is less than $\alpha = 0.05$, so it accepted the alternative hypothesis H_1 . In case of Internet user size $F_{calc} = 0.01$ (Levene's Test) is less than the critical value $F_{0.05, 1, 46} = 4.05$ therefore accepting the null hypothesis that the share of Internet users recorded in the two countries are not significantly different.

Table 6. ANOVA – The share Internet users

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.98	1	2.98	0.01	0.93	4.05
Within Groups	19,314.20	46	419.87			
Total	19,317.18	47				

Source: Made by author

How minimum significance level P-value of 0.93 was higher than that of $\alpha = 0.05$, the null hypothesis is accepted H_2 .

6. Conclusions

The results of the study showed that since 1990 the total population in Turkey has increased by 2.86 times by 2016 reaching 78,985,678 persons. At that time in Romania the number of population registered a slow increase of only 1.20 times, thus, at the end of 2016, the total population number reaching 22.178 940 persons. Analyzing the comparative increases in the two countries, it is noticed that the magnitude calculated in Romania of 4.79 million persons was 2.25 times lower than that calculated in Turkey. Developments in population growth in the two countries correspond to the average European and Asian trends. The main factors that contributed to population growth were: raising living standards, improving medical, educational and public services.

The average share of Internet users in Romania was 22.07% slightly higher than that registered in Turkey by 21.75%. In 2016, the highest weights for Internet users were recorded in 56.43% and 54.52% in the two countries. The accelerated increase in the number of Internet users in the two countries from 40% in 2010 to over 56% in 2016 Owing to the action of some macro-economic forces such as: economic, social and technological development, the development of telecommunication systems and networks, the emergence of computers and networks of personal and organizational communications etc.

The main barriers that hamper internet access in the two countries are: lack of infrastructure in isolated areas, cost of access, a good reason for people to ask for access to the service, lack of skills to use the Internet, political or religious motives.

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