

## Analysis of selected students' ICT indicators as possible motivating factors for e-commerce adoption

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**Abstract:** *The successful e-commerce implementation depends, among others, on factors that can be deliberated by the analysis of some ICT indicators. It was the main reason for the authors of this paper to try to establish in which extent the surveyed students are present or potential future users of e-commerce services. To this purpose a research was conducted using a survey containing standardized questions allowing the comparison of the acquired data with the same or similar relevant to the Republic of Serbia and the European Union. The data were collected in a period of several years permitting to the authors of this paper the detection of some trends. The derived results could be useful to all companies which included e-commerce in their business especially the ones that are targeting the younger population cluster.*

**Key words:** *e-commerce, Information Society, ICT indicators.*

### 1. INTRODUCTION

E-commerce is defined as the use of Internet and web and mobile devices to enable commercial transactions between individuals and business [1]. E-commerce has changed many things in the business and many companies, including SMEs, are forced to adopt this technology to be able to survive in the new economy businesses [2]. The importance of the global e-commerce market can be seen from the fact that it is expected to reach US\$ 2.0 trillion in 2016, up by 22.3 % from 2015 [3].

The adoption of e-commerce can be considered through different perspectives. One of the most important prerequisite for the successful implementation of e-commerce is, in the first place, to ensure the legislative and infrastructural framework required for its functioning [4]. Regarding the Republic of Serbia, this matter is regulated by the "Information Society Development Strategy in the Republic of Serbia until year 2020", a document adopted by the Serbian government in 2010 [5]. One section of this document is dedicated to e-commerce, defining next priorities:

- removal of normative obstacles to e-commerce development,
- electronic invoices and electronic payment,
- e-commerce development incentive,
- e-commerce consumers' protection and
- e-commerce development coordination.

In [6] the next environmental factors influencing the rate of B2C e-commerce adoption and diffusion were identified:

- ICT infrastructure,
- online payment mechanisms,
- the degree of credit cards penetration,
- legislative and regulatory framework,
- logistics infrastructure and
- education and awareness.

The problem of e-commerce adoption can be also considered from the enterprises point of view. In [7] the authors mentioned that studies investigating the adoption of e-commerce activities denote factors such as the quality of underlying ICT infrastructure, internal organization, ICT skills, adjustment costs, uncertainties surrounding e-commerce, competitive pressure, trading partner readiness, and perceived strategic value for the firm to be important determinants for both business-to-business and business-to-consumer e-commerce.

The third e-commerce adoption perception is the one that focus on the consumer. Different approaches can be applied to analyze this topic. One of them is based on TAM (Technology Acceptance Model), a theory that intends to explain the individual behavior regarding computer use. This model explains the attitude of the computer user faced with a new technology by defining that users' decision about how and when they will use it depends on perceived usefulness and perceived easy-of-use [8]. In this paper, the authors investigated the level of e-commerce adoption by the NSSB students by analyzing, on one side, some of the ICT indicators related to the use of ICT and Internet, and on the other side, students' activities related to buying/ordering over the Internet.

## 2. RESEARCH METHODOLOGY

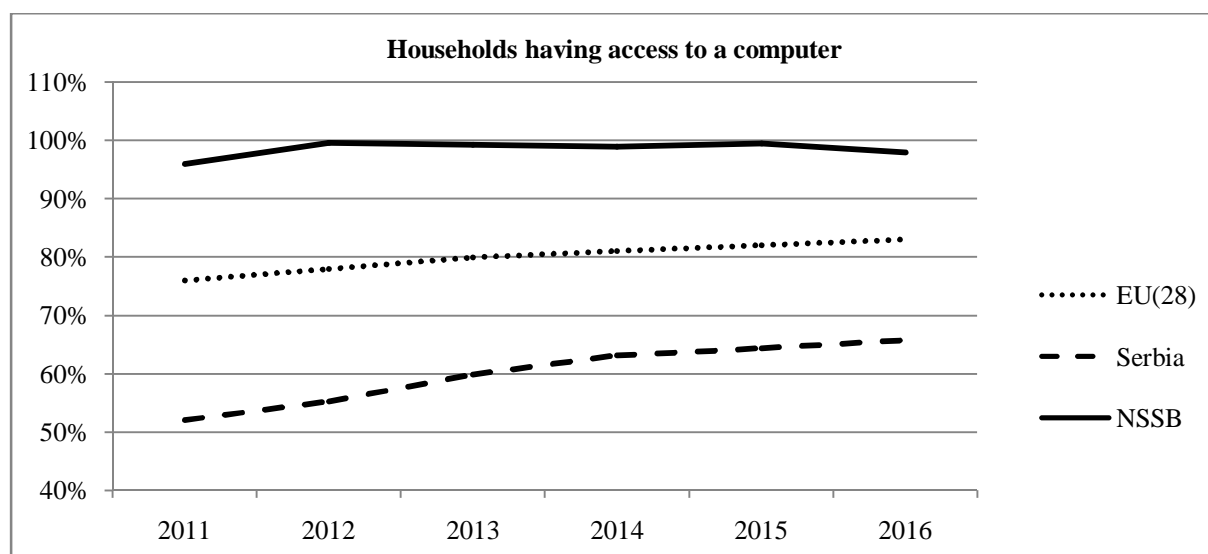
The data presented in this paper originate from three different sources. The first one was the Statistical Office of the Republic of Serbia, providing data about the usage of the Information and Communication Technology in the Republic of Serbia in the period from 2011 to 2016. [9,10,11,12,13,14] The survey was conducted by phone and the sample coverage was 2400 households and 2400 individuals in each of the mentioned years.

The second set of data was extracted from the database of the European portal Eurostat. [x] Most of them are related to the Digital Society indicators referring to the period from 2011 to 2016 for the 28 European Union countries (in further text Europe-28).

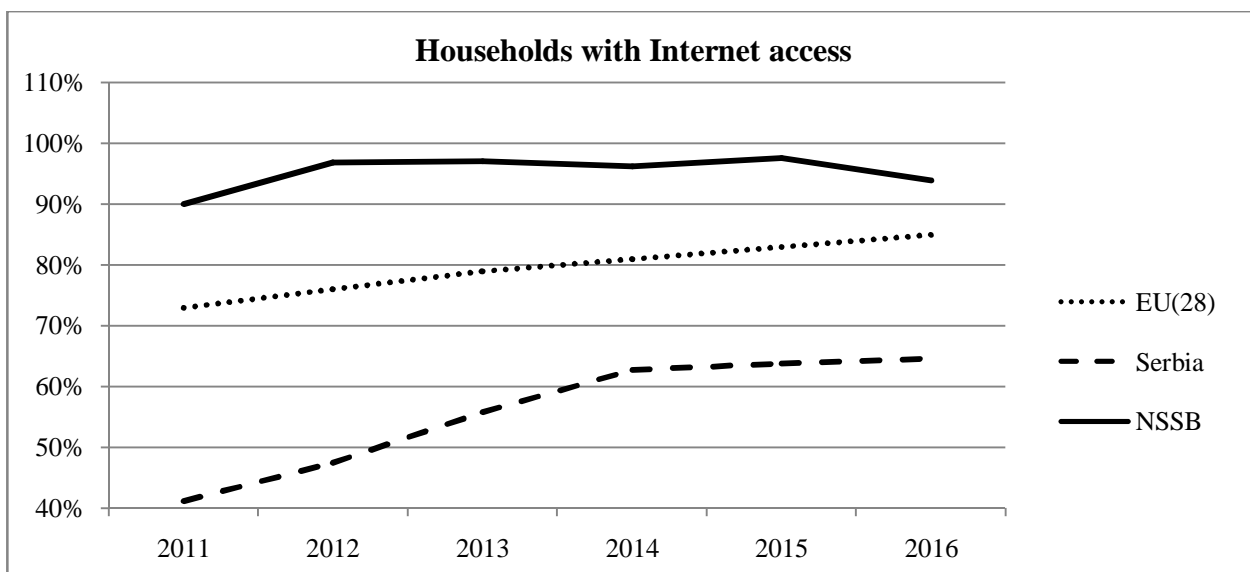
Regarding the first two set of data, some of the indicators were not available for all of the previously mentioned period. The last data set was gathered conducting a survey in which took part second year students of the Novi Sad School of Business (NSSB). The questionnaire was designed to be in concordance with the content and the structure of the questionnaires used by Eurostat for the Digital Society theme. Thus, it was possible to compare those data with the ones that originated from the Statistical Office of the Republic of Serbia and the Eurostat portal. The surveys were conducted from 2011 to 2016, while the sample coverages were respectively 200, 227, 135, 185, 209 and 98. To achieve the closest match of data coming from the three sources, we selected from the Statistical Office of the Republic of Serbia and Eurostat data referring to the population aged from 16 to 24.

## 3. DATA PRESENTATION AND ANALYSIS

Since one of the most important prerequisite of e-commerce usage is having access to a computer and an Internet connection, the first presented data will cover that topic. The first indicator is about households having access to a computer and regarding NSSB students, it didn't show significant changes during the last six years. For the year 2016 97.96% of NSSB students had access to a computer in their households. NSSB values for this indicator in the period from 2011 to 2016 are higher than the ones relative to the 28 European Union countries and Republic of Serbia (figure 1).



**Figure 1:** Percentage of households having access to a computer



**Figure 2:** Percentage of households having access to Internet

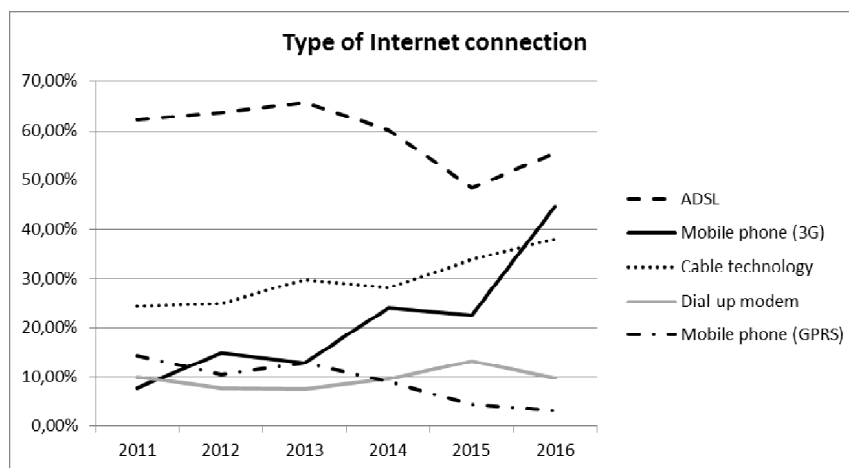
The second indicator, also being an important precondition for the e-commerce usage, is the one showing the percentage of households having access to Internet. The data are here similar to the previous ones, in the year 2016 93.88% of NSSB students' households had access to Internet. Although in the last six year there were periods of stagnation, and even decline of those percentages, they are still higher for the same period than they were in the 28 European Union countries and Republic of Serbia as well (figure 2).

Regarding the devices used to access Internet from home (table 1), NSSB students were using in the year 2016 most often their mobile phone (89.13%) which represents a growth of 75.24% comparing to the year 2011. The laptop is ranked on the second place (77.17%), also showing a growth, but less significant (36.06%). We should also mention the tablets, introduced as a new device category two years ago, with a percentage of 35.87%. It is obvious that students are showing much more interest to use mobile devices, while the use of desktop computers to access Internet is almost the same (69.57% in the year 2016 as it was in the year 2011 (73.33%).

**Table 1:** Devices used to access Internet from home (year 2016)

	NSSB	Serbia
Mobile phone	89.13%	92.20%
Laptop	77.17%	49.00%
Desktop computer	69.57%	79.50%
Tablet	35.87%	19.30%
Smart TV	13.04%	9.60%
Other mobile devices	2.17%	0.90%

Similar conclusions about the penetration of mobile devices can be drawn from the data concerning the type of Internet connection used by NSSB students (figure 3). Outdated types of Internet connections such as dial-up modems and mobile phones connected via GPRS are on the ones that are the less used and this situation didn't change in the last six years. While the use of dial-up modems is remaining the same in this period, 10.00% in 2011 comparing to 9.78% in 2016, the use of mobile phone with GPRS connection is constantly reducing reaching only 3.26% in 2016 comparing to 14.44% in 2011. The ADSL type of connection slightly varied in the last 6 years, in the interval from 48.53% to 62.22%, showing however lately a small decline. The use of the cable technology internet connection didn't change a lot as well from 2011 to 2016, but opposite to ADSL, it is showing a growth from 24.44% to 38.04%. The most significant change concerning the type of Internet connection is the considerable growth of the 3G mobile phone internet connection from 7.78% in 2011 to 44.57% in 2016.



**Figure 3:** Type of Internet connection for NSSB students

Before analyzing the behavior of NSSB students while using Internet, we will present some data about how frequently they use it. Concerning the last Internet access, 97.96% of NSSB students used Internet in the last three months. This percentage has been constantly high in the last 6 years, reaching even 100% in 2014 and 2015. This percentage is almost the same as the ones regarding the last use of Internet for people aged from 16 to 24 in Europe-28 (97%) and Serbia (97.1%). Of all NSSB students that have used Internet in the last three months, 93.88% did it daily, 3.06% did it at least once in a month (but not every week), 2.04% did it less than once in a month and finally 1.02% did it at least once in a week (but not every day). Those percentages are not following the trend that has been identified in the year 2011-2015, which showed that the daily use of Internet was continuously growing from 88.72% in 2011 to 99.03% in 2015, leaving just 0.97% of students accessing Internet once in a week (but not every day), while there were none of them using Internet less than once in a month or once in a month (but not every week). We expect to see from the data that will be gathered in the next years if this drop of Internet daily use will continue or if it was just an statistical glitch. Nevertheless, the percentage of NSSB students using Internet on daily basis in 2016 is still higher than the percentage of 16-24 years old population in Europe-28 (92%) and Serbia (88.8%).

Data related to NSSB students' Internet activities may also help to predict their future e-commerce user status. We will present in this paper only a segment of the figures correlated to students' Internet use, showing their top 5 Internet activities (table 2) in 2016. The table contains also data about those activities in the previous five years, the average values for the 2011-2016 interval, and in the last column, the growth or the decrease calculated comparing the year 2016 to the year 2011. The category "Watching video content from sharing services" is introduced in the questionnaire in 2016, so there is no prior data for it.

**Table 2:** Top 5 favorite NSSB students' Internet activities in 2016

	2011	2012	2013	2014	2015	2016	2011-2016 average	2016-2011
Participating in social networks	70.00%	74.01%	83.70%	80.54%	78.95%	84.69%	78.65%	14.69%
Sending/receiving e-mails	71.00%	78.85%	78.52%	84.86%	70.81%	72.45%	76.08%	1.45%
Watching video content from sharing services (Netflix, HBO)	-	-	-	-	-	65.31%	-	-
Telephoning or video calls	28.50%	40.53%	40.00%	52.97%	50.72%	60.20%	45.49%	31.70%
Playing/downloading games, images, films or music	63.50%	70.04%	75.56%	72.97%	64.11%	51.02%	66.20%	-12.48%

As expected for students as Internet users, all of the top 5 Internet activities are related to social networking, information exchange and entertainment. The most preferred activity is the participation in social networks such as Facebook, and it will probably remain on the top in the next years, since it is showing a constant percentage increase. Although telephoning or making video calls using Internet is on the fourth place as NSSB students' activity, it is the one that has shown the highest growth in the 2011-2016 period (31.70%).

Two more figures related to students' Internet activities are worth mentioning. The first shows that 13.27% of NSSB students used in 2016 Internet for Internet banking, which represents a growth of 6.90% comparing to 2011. The second indicates that in the same year 4.08% of students used Internet to pay goods or services using payment accounts (like

PayPal). Since this category of Internet activity is introduced for the first time this year in our questionnaire, we can't mention further details about its development in the past years.

The most interesting data about e-commerce collected through our questionnaire is certainly the ones about buying or ordering goods or services over the Internet for private use. As table 3 shows 71.43% of NSSB students bought or ordered goods or services over the Internet for private use in 2016, which is a higher percentage comparing to 16-24 years old population in Serbia (48.70%) and Europe-28 (67%). However, the percentage of buying and ordering in the last three months has the highest value in Europe-28 (54%), while it is much lower for NSSB (33.67%) and Serbia (31.50%). Still, NSSB students' percentages of buying and ordering over the Internet for private use in the last three months are very encouraging since they show a growth of 21.94% comparing to 2011. In the same period the percentage of students that have never ordered or bought goods or services over the Internet for private use dropped from 74.49% to 18.37%.

**Table 3:** Last buying or ordering of goods or services over the Internet for private use (2016, 16-24 years old population for Serbia and EU)

	NSSB	Serbia	EU(28)
In the last 3 months	33.67%	31.50%	54.00%
Between 3 and 12 months ago	37.76%	17.20%	13.00%
More than a year ago	10.20%	8.30%	7.00%
Have never ordered	18.37%	43.00%	31.00%

The last data that are presented in this paper are covering buying and ordering of goods and services over the Internet in the last 12 months for private use. As the table 4 shows, regarding NSSB students, the most popular category in 2016 was the one representing clothes and sports goods. This was expected because this category has been on the top in all previous years, starting with 11% in 2011 and ending in 2016 with 52.86%. It is interesting to point out that, for the 16-24 years old population in the same 2016 year, clothes and sports goods are the favorite category when it comes to buying and ordering over Internet in Serbia (57.2%) and Europe-28 (46%) as well. Concerning NSSB students, the category "other" had the second highest percentage (27.14%), followed by pharmaceutical products (15.71%), tickets for cultural events (14.29%), hotel accommodation (14.29%), food or groceries (12.86%), electronic equipment (10%) and so on.

**Table 4:** Types of goods or services that NSSB students bought or ordered over the Internet in the last 12 months for private use

Clothes, sports goods	52.86%
Other	27.14%
Pharmaceutical products	15.71%
Tickets for cultural events	14.29%
Hotel accommodation	14.29%
Food or groceries	12.86%
Electronic equipment (incl. cameras)	10.00%
Computer hardware	8.57%
Films, music	8.57%
Books/magazines/newspapers	7.14%
Other travel arrangements (transport tickets, car hire...)	7.14%
Household goods	4.29%
Video games and upgrades	4.29%
Telecommunication services (broadband subscriptions, uploading money on prepaid phone, cards...)	1.43%

#### 4. CONCLUSIONS

The basic ICT indicators, concerning households having access to a computer and households with Internet access, show that NSSB students has a great potential to become e-commerce consumers.

The fact that, regarding devices used to access Internet from home, NSSB students are using more and more they mobile phones, should be a hint for e-commerce companies to try to reach them not only through traditional Internet advertising, but also via popular mobile phone applications.

Data about students' Internet activities showed that the one that they prefer is participating in social networks. Although this activity is not directly related to e-commerce, it is a strong sign to all e-commerce companies that advertising in social networks is a good way to reach new customers, especially if their products or services are targeting students as market category.

Telephoning or making video calls using Internet is the activity that has shown the highest growth of all NSSB students' Internet activities (31.75%). This fact can be used by e-commerce companies by offering software apps as Skype to facilitate the communication with potential consumers, in the process of giving additional information about their products or services or while providing customer support services. Giving to their customers the possibility to use the video communication would be a great advantage over the usage of phone or e-mail.

Analyzing NSSB students' previous behavior while buying and ordering goods and services over Internet, it is obvious that e-commerce companies offering clothes and sports goods have the biggest chance to find future consumers among them. Pharmaceutical products, hotel accommodation and food or groceries should also be goods and services interesting for NSSB students. All of them are showing a considerable growth (from 8.54% to 10.85%) in 2016 comparing to the previous best percentage.

Maybe the most intriguing category of goods or services bought or ordered over the Internet is the one named "other". Since it has the second highest percentage among NSSB students (27.14%) and a considerably high value (17.90%) for 16-24 years old Serbian population, it represents a valuable category of unknown goods or services. For that reason, e-commerce companies should gather additional data, conducting their own surveys, finding which goods and services are hidden behind the "other" category.

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