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Research Article

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E-Entrepreneurship and Economic Development: the Case of EU Countries

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Abstract: The aim of our paper is to identify how entrepreneurs from European Union (EU) countries use information and communications technologies (ICTs) in their business activities. We also propose to identify if there are differences in the use of ICTs by entrepreneurs, according to level of economic development of EU countries. In order to achieve these goals, we analyse a sample of EU countries, by including them into two groups, according to the stage of their economic development. For analysing the data, we use several methods (the logical-constructive method, comparative methods and benchmarking). The benchmarking method helps us to estimate indicators at country level and to compare them between countries. Our results indicate that e-entrepreneurship in developed countries is more advanced compared to developing countries. There are also significant differences regarding the use of informational technologies between types of firms by their size. Small enterprises use in a lower proportion ICTs in their activity compared with large firms. Through the content of our research, we emphasize that in order to adapt to the rapid changing environment and also to the changes in the consumer's behaviour the enterprises should focus on introducing the ICTs in their activity to face the competition. Also, government policies should pay more attention to supporting development of information technology infrastructure.

Keywords: e-entrepreneurship, information and communications technology, economic development, SMEs, EU countries

JEL Classification: L26, M15, M13.

1 Introduction

The development and rapid implementation of information and communication technologies (ICTs), as well as the rapid pace of globalization in the last two decades, have transformed the business environment and has led to new challenges and opportunities in terms of entrepreneurial activities. ICTs refer to technologies that provide access to information through telecommunications and include the internet, wireless networks, cell phones, and other communication mediums (TechTerms, 2010). Increased use of ICTs is a key driver of economic growth, productivity, employment and reducing poverty (Qiang and Pitt, 2003; OECD, 2004; Jalava and Pohjola, 2007; Vu, 2011; Farhadi, Ismail and Fooladi, 2012; Lovrić, 2012) and together with education, training and R&D, one of the most important elements in building a platform for entrepreneurship (Intel Foundation, 2011). ICTs support entrepreneurship in different ways (Alderete, 2014; Yunis, El-Kassar and Tarhini, 2017), such as: increasing interconnectedness and communication; enhances the ability of entrepreneurs to develop new products, services, processes, and business models; facilitates faster access to different regional and international markets; and allows efficient management of customer relationships as well as the supply chain.

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Regardless of their size, today's entrepreneurs have the possibility to use extensively the internet to do business and also reach new markets. An increasing number of enterprises from EU countries adopt information and communication technologies for ensuring their survival and growth, but also to increase their competitiveness and to enhance innovation abilities. Adopting new information and communication technologies is also a way to enhance the way in which people capture and distribute information, lower production and labour costs, add value to products and services and increase the company's competitive advantage (Nguyen, 2009).

E-entrepreneurship defines the entrepreneurial activities that are linked to digital data networks. According to Matlay (2004), E-entrepreneurship describes the act of setting up new firms in the economy based on information technology and is understood as an entrepreneurial process used to create an e-business (Asghari & Gedeon, 2010). E-business is a relatively new term that involves the use of information technologies by enterprises to conduct its core business.

Our paper aims to investigate how entrepreneurs from the EU countries make use of e-business technologies. We take into account the dynamics of the use of ICTs in businesses over a period of nine years (2010- 2018). Also, we try to identify if the level of economic development of countries influences the use of ICTs by businesses. Moreover, we examine if the implementation of ICTs by firms is a factor that favours and facilitates innovation.

For achieving our objectives, we perform a comparative analysis between two groups of EU countries, according to their stage of economic development, namely *transition countries* (which are situated at a shift between efficiency and innovation) and innovation countries. The grouping of countries into the two categories is based on GDP per capita. In order to obtain more in-depth results, we also performed a comparative analysis between enterprises according to their size: small, medium and large.

The added value of our study arises from the fact that this kind of analysis, by groups of countries, have not been made in the literature. Another novelty is the fact that we consider an extended period of nine years for analysing the dynamics of ICTs in businesses. We don't lose sight of either the relation between the use of ICTs and innovation. Our results focus on the role played by the stage of economic development on e-entrepreneurship, and analyse punctually the role played by the use of informational technologies in business activities, and also in sustaining the innovations made by the enterprises.

To achieve our objectives, we have structured this paper as follows: section 1 is a brief literature review on the relationship between ICTs, innovation and entrepreneurship; section 2 describes the data used and the methodology applied; section 3 present and discuss the results of the empirical investigation, and the final section concludes.

2 Literature review

The analysis of the literature highlights the existence of a relatively small number of studies, especially empirical and focused on European countries, which examine the impact of the use of information and communication technologies on entrepreneurship. One possible explanation would be that such a topic is a relatively recent field of research. Taylor and Murphy (2004) discuss some major issues regarding the adoption of ICTs and e-business technologies by small and medium-sized enterprises (SMEs) and underline the factors on which the successful adoption of new technologies depends, as well as the obstacles that arise in the way of their use.

Other authors (Barba-Sánchez et al., 2007) have highlighted that the use of ICTs can contribute to the improvement of information and knowledge management within the company, it can reduce the costs of transactions, it can increase the speed of transactions, improve the external communication and the quality of customer services. Using panel data for a sample of 59 countries and for the period 2007-2011, Alderete (2014) examines the impact of ICTs on entrepreneurship and whether differences in ICTs development contribute to explaining differences between countries in terms of entrepreneurial activity. The author notes that ICTs have a positive and significant influence on entrepreneurship, and countries with a higher level of development of ICTs would have a higher level of entrepreneurial activity.

In its study, Waesche (2003) has analysed the role of telecommunications reform in affecting entrepreneurship, focusing especially on the case of Germany. Its results show that European telecommunication costs and restrictions posed several challenges to businesses.

Another study, realized by Amit and Zott (2001) emphasizes that e-business can create new value through the ways in which transactions are activated. The authors have proposed to identify common models of value creation when using e-business. Their results suggest that the emergence of virtual markets opens up new sources of innovation (e.g., business model innovation) that may require a parallel shift in strategic thinking towards more integrative, dynamic, adaptive and entrepreneurial strategies.

Some authors (for example, Zhao, 2005; Jelonek, 2015; Higón, 2011; Amankwah-Amoah, Osabutey, and Egbetokun, 2018) have discussed the relationship between entrepreneurship and innovation, and have argued the role played by e-entrepreneurship in delivering innovative entrepreneurial activities. Zhao (2005) finds that entrepreneurship and innovation are closely linked, and they play a crucial role for the long-term sustainability of e-commerce and e-business. Jelonek (2015) also discusses the relationship between e-entrepreneurship and innovation and shows that Internet technology brings numerous benefits for entrepreneurs, such as lower operating costs and the possibility to operate on a scale that is larger than before. Using data for a sample of SMEs in the UK, Higón (2011) examines the link between ICTs and innovation activities of these companies and finds that the impact of ICT depends first and foremost on the types of ICTs applications and the type of innovation, and in the second line on company and management characteristics, but also on external factors. In line with previous research, other authors (Amankwah-Amoah, Osabutey, and Egbetokun, 2018; Asongu and Nwachukwu, 2018) have examined the role of new technologies in promoting entrepreneurship and innovation and have emphasized the need for institutional support for extending the application of ICTs.

An increasing number of researches (including Bandera, Collins, & Passerini, 2018; Cujia Berrio, Redondo, & Hernández, 2018; Barnett, Hu, & Wang, 2019; Hanoteau & Rosa, 2019) have argued for positive and significant influence of the adoption and implementation of ICTs on entrepreneurship. The Global Entrepreneurship Monitor also suggested that information technologies explain a large portion of the increase in opportunity motivated entrepreneurship, and a greater access to ICTs may encourage entrepreneurs to be more innovative (GEM, 2018). It is also appreciated that the development of digital technologies leads to new forms of entrepreneurship and networking, but it also leads to heated debates about potential threats, such as privacy issues (Bosma & Kelley, 2019).

Finkle et al. (2000) analyses the opportunities and challenges presented by the use of e-commerce for entrepreneurs and suggests some strategies that they can implement in order to benefit from e-commerce opportunities. The authors conclude that in the near future, the rapid growth of e-commerce (especially in the form of business-to-consumer) will lead to lower barriers to entry in the online market and intensify competition, which will reduce prices and profits so that it will be increasingly difficult for a business to survive.

Guillén and Suárez (2001) have shown that the Internet has not developed throughout the world in a uniform way. The percentage of the population which uses the internet in a regular way varies from over 50% in the Scandinavian region to less than 1% in many underdeveloped African, Central American, and South Asian countries. The differences in Internet development across countries are accounted for by per capita income, and by the existing infrastructure and competition in the telecommunications sector (Hargittai, 1999; Oxley, & Yeung, 2001). The results obtained by Guillén and Suárez (2001) showed the existence of a significant relationship between entrepreneurial activities, investments, and internet development. They also emphasized that the internet development, measured in terms of the numbers of users and hosts, is higher in countries with conditions that favor entrepreneurship and investment, and with a democratic political system.

The literature review shows an increase in researchers' interest in examining the determinants of ICTs use by entrepreneurs and SMEs, the benefits of ICTs application, but also the obstacles to ICTs adoption. Mehrrens et al. (2001) argue that the adoption of the Internet by SMEs is significantly influenced by three factors, namely perceived benefits, organizational readiness and pressure from customers and suppliers. Similarly, but with reference to small and medium US businesses, Grandon and Pearson (2004), found that

e-commerce adoption by these businesses is significantly influenced by four factors, namely: organizational readiness, external pressure, perceived ease of use, and perceived usefulness. Lucchetti and Sterlacchini (2004) indicate as significant determinants of the adoption and use of ICTs by SMEs the financial resources, technical skills, and firm characteristics. Analysing a sample of companies from EU countries, the results of Oliveira and Martins's (2010) study show that the main factors affecting the adoption of e-business by firms would be the perceived benefits and obstacles of e-business, technology readiness, competitive pressure, and trading partner collaboration. Using a sample of SMEs in Turkey, Kaynak, Tatoglu and Kula (2005) examined the factors that encourage firms to make e-commerce via the Internet. Research findings show that the benefits of using e-commerce significantly influence the adoption of it by investigated SMEs. The authors also find that the limitations associated with the use of e-commerce would not have a significant effect on its adoption. However, the study suggests that a lack of legal regulations and security issues are among the most important limitations of adopting e-commerce by SMEs. Daniel and Grimshaw (2002) compare the reasons why small and large businesses in the UK use e-commerce and the benefits of using it. The results of the study indicate that a larger percentage of small businesses are using e-commerce to respond to competitors by providing improved customer service and improving supplier relationships. By comparison, large firms have a greater interest in adopting e-commerce for reasons of operational efficiency. Thus, the authors point out that small businesses regard e-commerce as an opportunity to improve their performance, while for large firms, e-commerce is viewed more defensively, especially as an opportunity to increase operational efficiency. Another study (Stansfield & Grant, 2003) discusses the main problems and obstacles which appear in the way of adopting and using the Internet and e-commerce by SMEs, especially by micro and small businesses. Research findings indicate that lack of knowledge, skills, and lack of counselling and support would be important factors that would influence firms not to adopt the Internet and electronic commerce. The authors also point out that most of the small businesses investigated are in the early stages of Internet adoption, and few companies show the inclination towards its full integration.

Some studies have focused on analysing the obstacles in the use of electronic commerce by SMEs in different countries. For example, Solaymani, Sohaili, & Yazdinejad (2012) show that the major obstacles in the use of e-commerce by SMEs would be the ignorance by the managers of the companies of the use of the internet in e-commerce, the costs regarding the access to the internet, the high uncertainty of customers regarding electronic selling, and lack of culture in electronic purchasing. MacGregor and Kartiwi (2010) examine whether obstacles to e-commerce adoption differ between SMEs in a developed and a developing economy. Based on the analysis, the authors conclude that SMEs in the developed economy are more concerned with technical issues (for example, security issues, cost of implementation) while those in the developing economy are more concerned with organizational barriers (such as unsuitability of e-commerce for SMEs, lack of time for implementation). Another study (Ifinedo, 2011) discusses the factors that influence the acceptance of new technologies by the SME and finds that perceived benefits, managerial support, and external pressure would be the key determinants of the acceptance of the new technologies by the sampled SMEs. Research conducted by Chivasa & Hurasha (2016) indicates that the most important factors that would influence the use of ICTs by the analysed SMEs would be internet cost, ICTs infrastructure, management attitude, and knowledge.

Further research (such as Wu, Mahajan, and Balasubramanian, 2003; Rapp, Schillewaert and Hao, 2008; Migdadi et al., 2016; Yunis, El-Kassar and Tarhini, 2017) provides evidence of the impact of ICT adoption and e-business on business performance. Wu et al. (2003) find that e-business adoption positively and significantly influences the performance of a company, which is measured by efficiency, sales performance, customer satisfaction, and relationship development. Rapp et al. (2008) find that e-business innovation strongly influences the performance of customer relationships, which in turn would contribute to sales growth and business performance. Similar results are also obtained by Migdadi et al. (2016) who argue the positive and significant effect of e-business implementation on business performance. The authors also conclude that companies that offer e-business training for their employees can increase efficiency and sales. The role played by the use of ICTs in the success of a business is also underlined by Tarutė and Gatautis (2014), who argue the contribution of ICTs to improve the performance of SMEs. Similarly, Cant and Wiid (2016) support the crucial importance of ICTs for the success of SMEs and argue that the

main obstacles to the use of ICTs by the investigated companies would be the high cost of ICTs systems and the lack of knowledge in their use. Yunis, El-Kassar and Tarhini (2017) examine the effect of using ICTs on company performance and the role that corporate entrepreneurship can play in this relationship. The results of the study indicate a positive and significant association between the use of ICTs and organizational performance. In addition, the authors find that innovation and corporate entrepreneurship can have a strong mediation effect on the relationship between ICT use and performance. Another author (Abebe, 2014) examines the impact of e-commerce adoption on the performance of SMEs and to what extent it depends on the entrepreneurial orientation of SME managers. Based on the empirical analysis, the author finds that the adoption of e-commerce has a positive effect on SMEs' annual sales growth rate, and the effect is greater when the manager of the company has a higher level of entrepreneurial orientation.

The European Commission (2015) points out that the smart use of information and communication technologies by enterprises is a critical factor for success in innovation, competitiveness, and growth. Because the large companies are moving to exploit the advantages offered by ICTs, smaller companies have to follow suit or risk being left out of digital supply chains. The smart use of ICTs refers to the ability of companies in a supply chain to interact electronically and seamlessly, avoiding or significantly reducing paper-based, manual data processing. It also refers to unprecedented opportunities for companies, notably SMEs, to enter new markets by enabling them to participate in global digital supply chains.

The crucial role of access to finance for entrepreneurs and SMEs has led some researchers (such as Shahrokhi, 2008; Chen et al., 2018; Tchamyoun et al., 2019) to focus on examining the importance of information technology and the internet for finance. Thus, Shahrokhi (2008) highlights some of the benefits of using Information Technology and the Internet over business financing, such as quick access to information, the ability to electronically transmit the business plan, direct contact between entrepreneurs and various providers of financial resources. Chen et al. (2018) theoretically and empirically examine the impact of internet use on access to external financing of small and micro businesses in an emerging economy, such as China. The research results indicate the positive role that Internet access has in alleviating the financing difficulties of these companies, which would support their sustainable growth. The authors also stress the need for entrepreneurs to pay more attention to disclosing information online, which would reduce information asymmetry between borrowers and lenders and thus could facilitate their access to external financing. Tchamyoun, Erreygers, and Cassimon (2019) analyse the relationship between the use of ICTs and financial access and points out that the development of ICTs mitigates financing constraints, stimulates economic growth and helps reduce poverty.

The review of literature that regards the way entrepreneurs from different countries use information and communication technologies in their activities indicates a rather small number of research focused on European countries. Therefore, our study contributes to the development of existing literature by providing evidence regarding the differences that exist between EU countries in terms of the adoption and use of information and communication technology by entrepreneurs.

3 Data and methodology

The primary objective of our paper is to measure the proportion in which entrepreneurs from EU countries use ICTs in their business activities, and if this depends on the degree of economic development of the countries. We want to find if there are differences between countries in the use of information technologies according to their stage of economic development. In fact, we want to see if countries with higher degrees of economic development, favour the implementation of ICTs in business. We also intend to test the existence of a relationship between e-entrepreneurship and the implementation of innovation in businesses.

For achieving the main objective, we considered a period of nine years, between 2010 and 2018 and a sample of 28 European Union member countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom. We gathered the data from several data bases which offer information

regarding the use of ICTs in businesses: Eurostat database (European Commission, 2018) and World Bank DataBank (World Bank, 2018).

In order to identify how entrepreneurs from countries with different stages of economic development use ICTs in their daily business activities, we have divided the sample of 28 countries into two groups considered as criterion their stage of economic development. For this grouping, we have considered the classification made by Schwab and Sala-i-Martin (2017). In this report, the authors have considered the level of GDP per capita as a criterion for the classification of countries (see table 1) and have established several categories of countries. From the five groups of countries considered by Schwab and Sala-i-Martin (2017) in their report, for our analysis, we will consider only three, namely: *efficiency-driven economies*, *in transition between efficiency and innovation*, and *innovation-driven economies*.

The Global Competitiveness Report (Schwab & Sala-i-Martin, 2016) describes the economies from the *efficiency-driven* stage of development as countries that must begin to develop more efficient production processes and increase product quality because wages have risen and they cannot increase prices. At this point, competitiveness is increasingly driven by higher education and training (5th pillar), efficient goods markets (6th pillar), well-functioning labour markets (7th pillar), developed financial markets (8th pillar), the ability to harness the benefits of existing technologies (9th pillar), and a large domestic or foreign market (10th pillar). Moving forward, when the countries shift to the *innovation-driven* stage, wages will have risen by so much that they are able to sustain those higher wages and the associated standard of living only if their businesses are able to compete using the most sophisticated production processes (11th pillar) and by innovating new ones (12th pillar).

The classification of the EU-28 countries considered in our analysis is presented in Table 1 below. From all the 28 countries only Bulgaria is included in the efficiency-driven stage. For the accuracy of our results, we include Bulgaria in the transition stage. Therefore, for our further analysis, we investigate two groups of countries: in transition and innovation-driven economies.

The literature has also analysed the effects of ICTs on enterprises innovation and showed that very often ICTs can be a tool in stimulating innovation (Johannessen, 1994). Other studies (Awazu et al. 2009; Karadal and Saygin, 2011; Urbinati et al. 2018) also emphasized that the firms use the information technologies in an active way and with their help are trying to create new product ideas and make their productions convenient for their customers' needs. The results of Awazu et al. (2009) showed that ICTs are very important for the entire innovation process. Their role is significant also for the generation of idea and but also for developing, experimenting and testing, and, finally, to the commercialization of ideas. The authors also affirm that the use of ICTs has already brought many important changes to innovation management. A more recent study of Urbinati et al. (2018) underlined that the informational technologies have become a key enabler of innovation because a high number of firms are using digital technologies to manage their innovation processes. Also, they point out that digital technologies can be used and implemented to manage open innovation processes through easier access and sharing the knowledge created and transferred.

Starting from those stated above we formulate the hypothesis that we intend to test in this study:

Hypothesis 1: the level of economic development of countries influences the use of information and communications technologies by entrepreneurs.

Hypothesis 2: the use of information and communications technologies help businesses to be innovative.

The methods used to analyse the data are: the logical-constructive method and the comparative methods, which facilitate the confrontation of theoretical notions with empirical data. To complete this, we call for benchmarking which helps us to estimate the country indicators in the sample and to compare the nowadays data with a reference year, in our case 2010. The graphical method helps us to understand in depth the dynamics of the indicators by visual identification of the evolution paths.

Table 1. The classification of EU-28 countries according to their stage of development (Source: processed by the authors after Schwab and Sala-i-Martin, 2017 and Schwab, 2018)

| <i>Stage of economic development of countries</i> | | | | |
|---|---------------------------------------|--|--|--|
| | <i>Stage 2: Efficiency-driven</i> | <i>The transition from stage 2 to stage 3</i> | <i>Stage 3: Innovation-driven</i> | |
| GDP per capita (in USD) | 3.000-8.999 | 9.000-17.000 | >17.000 | |
| | Bulgaria (8.064) | Croatia (13.138,3) Hungary (15.531,2) Latvia (15.547,2) Lithuania (16.730,2) Poland (13.822,6) Romania (10.757) Slovak Republic (17.664,3) | Austria (47.290) Belgium (43.582) Cyprus (24.976,2) Czech Republic (20.152,4) Denmark (56.444,1) Estonia (19.840,1) Finland (46.016,7) France (39.869,1) Germany (44.549,7) Greece (18.637,3) | Ireland (70.638,3) Italy (31.984) Luxembourg (105.803,1) Netherlands (48.345,7) Malta (27.250,4) Portugal (21.161,3) Slovenia (23.654,4) Spain (28.358,8) Sweden (53.217,6) United Kingdom (39.734,6) |

Note: GDP per capita, in USD, values are in parenthesis.

4 Results and discussions

The results of our empirical analysis highlight important differences between the European Union member countries as regards the adoption and utilization of the information and communications technologies at the enterprise level. For analysing the evolution of the considered indicators in nine years, and also for comparing the indicators obtained for the two groups of countries, we consider the values in a relative form. First of all, because the data from Eurostat were available in the percentage of enterprises and, second of all, for realizing a comparison, we consider to be more useful to use percentage values. Because we focus our empirical investigation on several countries that have different levels of development, we have to keep in mind that a random number of enterprises can be considered as significant for a developing economy and insignificant for a developed economy.

Figure 1 presented below points out that, in 2018, 97% of the businesses from European Union countries had access to the internet. Taking the year 2010 as a reference point (when only 94% of the enterprises had access to the internet) we observe an increase of three percentage points in nine years. Because we analyse the values expressed in percentages, and 1% can express tens or hundreds of thousands of enterprises, we consider a modification of 1% as being significant for our analysis.

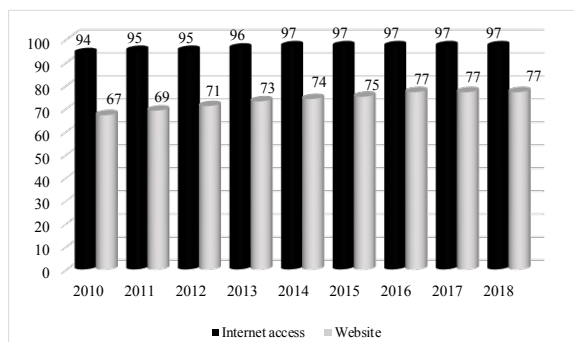


Figure 1. The evolution of the use of information and communications technologies in EU enterprises between 2010 and 2018 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/eurostat)

An increasing number of entrepreneurs focus on the importance of their business to be visible on the internet. Therefore, the websites of businesses must offer higher functionality, such as the possibility of online ordering, product and information catalogues, order tracking, product customization, social networking. Our findings point out that in 2018, 77% of the firms from the European Union declared having a website. The percent of enterprises with a website registered a significant increase in the last nine years, more exactly an increase of ten percentage points compared to 2010.

In Table 2 we present the use of information and communication technologies by each one of the EU-28 countries in 2010 and in 2018. Thus we can observe the positive and negative evolution as regards access to the internet and the existence of a website.

The share of businesses that have a website was, in 2018, above the EU average for 15 of the 28 EU countries considered in the analysis. Therefore, for fifteen EU countries, 77% or more businesses reported having a website. In 2018 the situation registered a significant improvement compared to 2010. In 2010 only 67% of the European Union enterprises reported they had their own website.

In 2018, at the bottom of the ranking were situated countries with lower levels of economic development, such as Romania (only 44% of the enterprises had a website), Bulgaria (51% of the enterprises), and Latvia (with 63% of the enterprises). Portugal was the developed country that had shares of the companies with a website similar to Latvia (63%).

The countries with the best results regarding the existence of a web site for the enterprises and situated at the top of the ranking are Finland and Denmark (with a share of 96% of the enterprises having a website), Netherlands (94%) and Sweden (92%). These results confirm our first hypothesis that the entrepreneurs from more developed countries use in higher proportion information and communications technologies compared to those from developing countries. At the top of the ranking regarding the percentage of enterprises that have a website we find mainly the Nordic countries and at the end there are Central and Eastern European countries, which have emerging economies and are former socialist countries. They have overcome their background, and have enrolled with success in a process of transition to market economy. But although their transition was a success their economies are still behind the more developed economies.

Table 2. E-entrepreneurship presence in EU-28 countries, 2010 and 2018 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/Eurostat)

| Country | Website | | Internet access | | Country | Website | | Internet access | |
|---------|---------|------|-----------------|------|---------|---------|------|-----------------|------|
| | 2010 | 2018 | 2010 | 2018 | | 2010 | 2018 | 2010 | 2018 |
| EU | 67 | 77 | 94 | 97 | LV | 48 | 63 | 91 | 100 |
| AT | 80 | 88 | 97 | 100 | LT | 65 | 78 | 96 | 100 |
| BE | 78 | 84 | 97 | 99 | LU | 70 | 83 | 96 | 100 |
| BG | 37 | 51 | 85 | 95 | HU | 57 | 66 | 90 | 91 |
| CZ | 67 | 77 | 94 | 97 | MT | 66 | 82 | 94 | 96 |
| CY | 52 | 71 | 88 | 96 | NL | 81 | 94 | 98 | 100 |
| DK | 88 | 96 | 97 | 100 | PL | 65 | 67 | 96 | 96 |
| DE | 81 | 87 | 97 | 99 | PT | 52 | 63 | 94 | 98 |
| EE | 70 | 78 | 96 | 99 | RO | 35 | 44 | 79 | 86 |
| IE | 68 | 79 | 92 | 97 | SI | 73 | 84 | 97 | 99 |
| GR | 58 | 65 | 90 | 86 | SK | 74 | 76 | 98 | 96 |
| ES | 62 | 76 | 97 | 98 | FI | 87 | 96 | 100 | 100 |
| FR | 58 | 69 | 97 | 99 | SE | 89 | 92 | 96 | 99 |
| HR | 61 | 73 | 95 | 97 | UK | 76 | 82 | 91 | 94 |
| IT | 61 | 71 | 94 | 97 | | | | | |

The biggest improvements over the nine-year period analysed, in the percentage of enterprises that have a website, were recorded in Cyprus (an increase of 19%), Malta (an increase of 16%) and Latvia (15 %). All 28 countries have registered an increase in the percentage of enterprises that have a website.

Analysing access to the internet for the enterprises we observe that almost all the 28 countries have registered an increase in 2018 compared to 2010. In 2018 in average 97% of the enterprises from the EU countries had access to the internet. Moreover, 19 countries registered values equal to or higher than the EU average (97% or more businesses reported having access to the internet). At the bottom of the ranking are situated countries like Romania and Greece, where only 86% of the enterprises reported having access to the internet in 2018, followed by Hungary, with 91% of the enterprises with access to the internet.

The situation has registered an improvement compared to 2010 when only 94% of the EU enterprises had access to the internet. Also, in 2010, 8 countries registered values below the EU average. Nine years ago, Romania was still at the bottom of the ranking, with only 79% of the enterprises with internet access. Other countries with values under 90%, in 2010, were: Bulgaria, Cyprus, Greece, and Hungary.

At the top of the ranking, we find more developed economies. In 2018, seven countries (Austria, Denmark, Latvia, Lithuania, Luxembourg, Netherlands, and Finland) reported that 100% of their enterprises had access to the internet, compared to 2010, when only the entrepreneurs from Finland had 100% access to the internet.

The biggest improvements of Internet access for businesses, in 2018 compared to 2010, were recorded in Bulgaria (10%), Latvia (9%), Cyprus (8%), and Romania (7%). We also observed that only two countries registered a reduction of Internet access for enterprises: Greece (a reduction of 4%) and Slovakia (-2%). Poland was the only country that has not changed at all the percentage of enterprises having internet access in the last nine years.

In figure 2, we present the evolution of the EU enterprises that have a website, by groups of countries, according to their stage of economic development (innovation-driven economies and transition economies). Our findings show that in the transition countries only 55% of the businesses had in 2010 a website, while in the innovation-driven ones, 71% of the businesses had a website. Moreover, the results for the transition economies were situated below the EU average (of 67%) while for the innovation-driven economies were situated above. Both groups of countries had a positive evolution in the past nine years (9% and respectively, 10%). Nevertheless, the economies in transition are still situated below the EU average (of 77%) as regards the percentage of enterprises that hold a website. The innovative and more developed economies maintain their position above the average EU average.

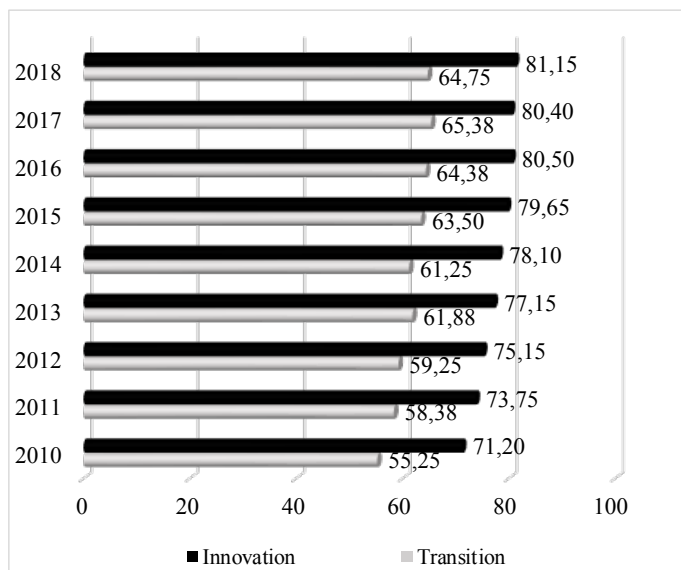


Figure 2. The evolution of the EU enterprises having a website, between 2010 and 2018, by groups of countries (Source: processed by the authors after ec.europa.eu/eurostat)

Figure 3 is summarizing the dynamics of internet access for enterprises by grouping the countries according to their stage of economic development. Our findings confirm once again the first hypothesis and point out that the innovation-driven economies have more enterprises with access to the internet compared to the transition economies. The transition countries maintain for the entire period their position below the EU average (with -3% in 2010, and with -2% in 2018). The innovation-driven countries maintain their position above the EU average for the entire period. The evolution over the years is positive for both groups of countries which is a positive fact, emphasizing that the decision-makers from the EU countries are making efforts in ensuring internet access for the enterprises.

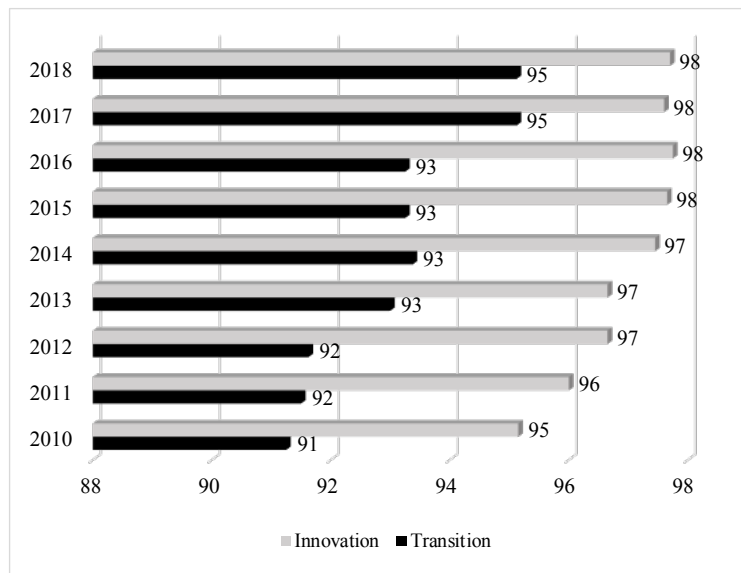


Figure 3. The evolution of the EU enterprises with internet access, between 2010 and 2018, by groups of countries (Source: processed by the authors after ec.europa.eu/eurostat)

Small and medium enterprises (SMEs) are considered the engine of economic and social development of a country, appreciation resulting from the fact that they generate a great part of a country's gross domestic product and are an important source of job creation. The major importance of these enterprises to the national economy results from the fact that, through their dynamism, they are considered an engine of innovation and growth. The role of SMEs in the national economy can be highlighted based on their overwhelming share in the total number of enterprises (Roman & Rusu, 2011).

For this reason, we extended our analysis to the enterprises grouped by their size. Thus, we investigate how enterprises use informational technologies according to their size. Our results are described in detail in figure 4. Thus, as the size of the enterprise grows also grows the percentage of businesses that own a website or have access to the internet. Small enterprises (defined by Eurostat as the enterprises that have between 10 and 49 persons employed) reported, in 2018, values for the use of informational technologies below the EU average. Medium enterprises have between 50 and 249 persons employed. Large enterprises have more than 250 persons employed. The last two categories had values above the average regarding the use of informational technologies.

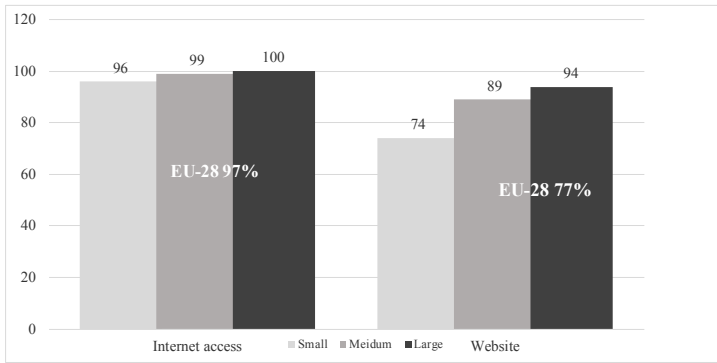


Figure 4. Percentage of EU enterprises using informational technologies, grouped by their size class, 2018 (source: processed by the authors after ec.europa.eu/eurostat)

The situation changes when we focus on internet access by the size of the enterprises but we differentiate the countries by their stage of economic development (see Figure 5). The internet access for large enterprises remained the same, in the last nine years, regardless of the degree of economic development of countries. When we look at the other sizes of enterprises, we find significant differences. The percentage of small enterprises that have internet access is smaller for the developing economies compared to innovative ones. However, it is worth noting that the percentage of small enterprises in transition countries that have access to the internet has increased significantly in 2018 compared to 2010 (an increase of 5%). Small enterprises from developed economies also registered an improvement as regards access to the internet, of 4% in the last nine years. This result points out the fact that Small and medium enterprises are trying to adapt to the changing environment from the digital era and are starting to focus on including the information and communications technologies in the business activities.

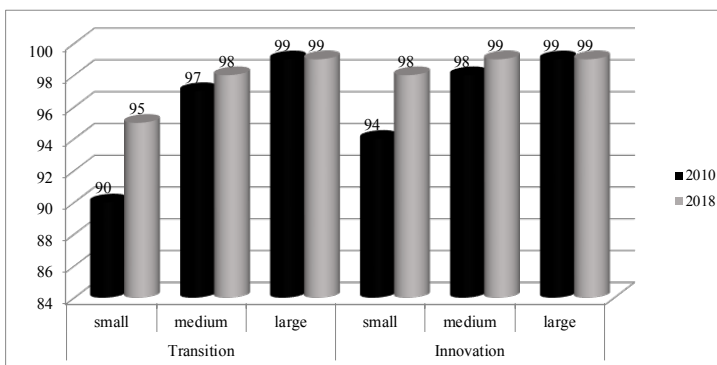


Figure 5. Enterprises with internet access by size class, and by groups of countries, 2018 compared to 2010 (% of enterprises) source: processed by the authors after ec.europa.eu/eurostat)

A particular element is represented by the fact that even though in 2018 was observed an increase in the percentage of small enterprises that have internet access compared to 2010 for both groups of countries, only in innovation-driven countries the value has reached the EU-28 average (97%). Once again it is confirmed the fact that the smaller the enterprise, the more difficult it is for it to adapt to the changes that occur in the external environment, in our case to the e-entrepreneurship practices.

The situation for medium enterprises is different as the share of medium enterprises that had access to the internet in 2018 was similar to the share of large enterprises (99%), in more developed countries. For the transition countries, the share of medium enterprises with internet access was only 1% smaller compared to large enterprises (98%).

Figure 6 describes the share of enterprises having a website both for transition and for innovation-driven countries in 2018 compared to 2010. Our results point out that the percentage of enterprises having a website is lower in the case of small-sized ones. Moreover, the share of enterprises that have a website is smaller in the transition countries for all the categories of enterprises.

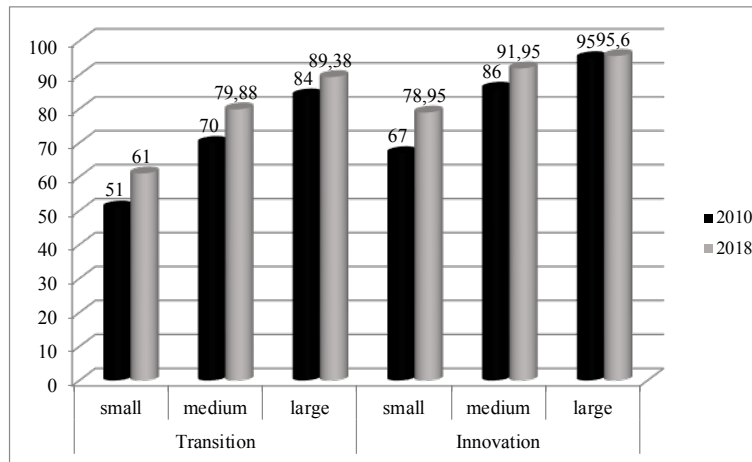


Figure 6. Enterprises having a website by size class, and by groups of countries, 2018 compared to 2010 (% of enterprises) source: processed by the authors after ec.europa.eu/eurostat)

Large enterprises had registered values above the EU-28 average as regards the existence of a website both in the reference year and in 2018. But, as the size of the enterprise decreases, the percentage also decreases, reaching values below the EU average for small businesses.

The adoption of ICTs in enterprises can be represented graphically by an S-shape curve of cumulated adopters (as seen in Figure 7). Cumulative adoption rates (measured by the percentage of enterprises) progress slowly at the beginning, and then start to accelerate and eventually slow down and stabilize as they approach the saturation point.

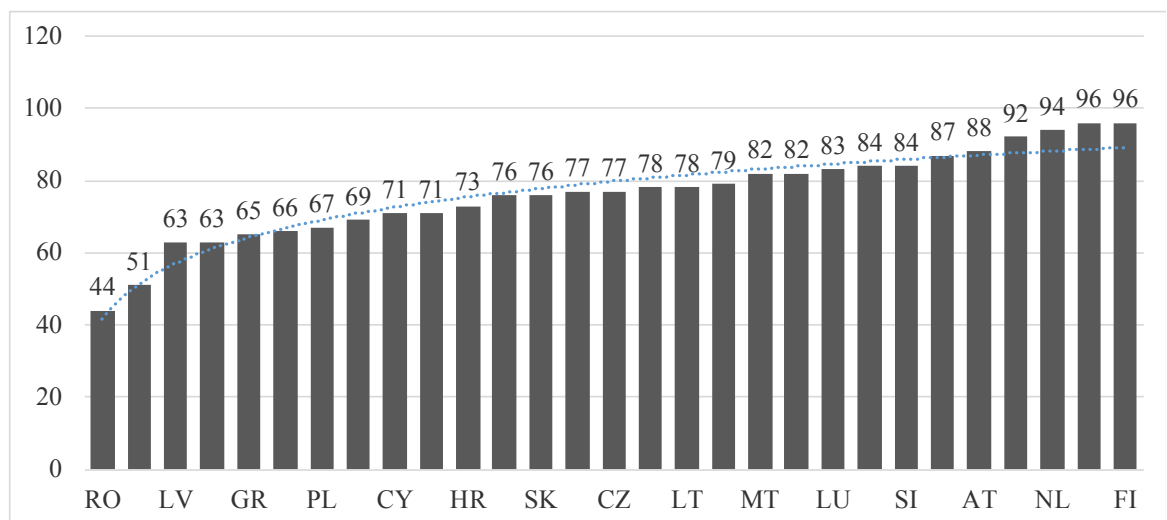


Figure 7. Enterprises holding a website, 2018 (% of enterprises) (source: processed by the authors after ec.europa.eu/eurostat)

In this theoretical adoption model represented by the S-curve, we did not consider the temporal dimension; this fact shows that the analysed countries can evolve at different speeds in time.

As shown in Figure 7, the cumulative rates of businesses that have a website have a rapid acceleration, then deceleration and ultimately saturation. The point of saturation is situated around 90% in the majority of the countries considered in the analysis. Although almost all countries are in a progressive phase of having a website, the cumulative adoption rates are rising at a slower pace when approaching a theoretical saturation point.

Figure 8 is summarizing the dynamics of the enterprises whose website offers a description of the goods or services provided and a price list, by grouping the countries according to their stage of economic development.

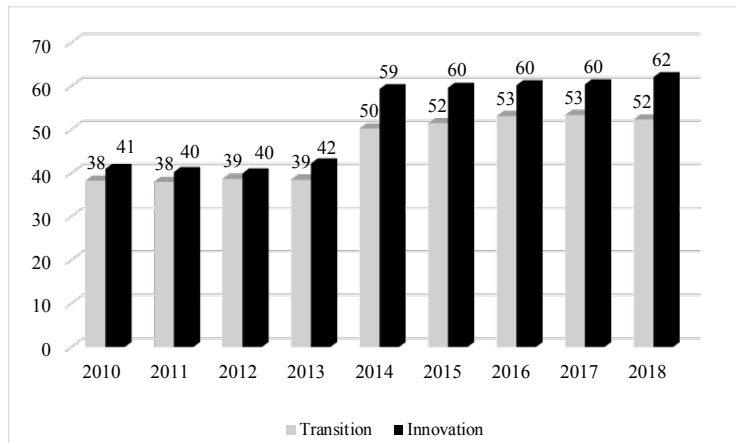


Figure 8. Percentage of EU enterprises where the website provided description of goods or services, price lists, by groups of countries (Source: processed by the authors after ec.europa.eu/eurostat)

The results obtained, emphasize an ascendant trend for both groups of EU countries from 2010 to 2015. Comparatively, 2015-2018 was a period of stagnation for all the EU countries, while in 2018 the countries with economies in transition have registered a decrease of 1% of the enterprises that provide the information mentioned above, and the innovation-driven countries have resumed the upward trend. Between 2013 and 2014, there was the largest positive leap in the percentage of businesses offering on their site information on the goods or services commercialized and a detailed list of prices. Thus, for countries classified as economies in transition, there was an increase with 11% of the enterprises, and for countries belonging to the group of innovative economies an increase of 17% enterprises.

We also, have noted significant differences between the European Union member countries when we focused the analysis on the enterprises where the website provided advertisement for open job positions or online job applications.

As described in Table 3, the percentage of enterprises that promote online job applications has increased in 2016, compared to 2010, with 8% for more developed countries, and with 5% for developing ones. Therefore, in 2016, at the top of the ranking were situated: Netherlands (57% of the enterprises were advertising jobs or offers online job applications), Denmark (47% of enterprises), and Finland (with 43% of enterprises), with values above the average for the innovation countries. At the bottom of the ranking, we find once again Bulgaria (9% of enterprises) and Romania (10% of enterprises) and Latvia and Portugal (16% of enterprises). This indicator is important because seeking a job nowadays, in the digital era, is viewed differently from those looking for a job traditionally. A study of Pew Research Centre (Smith, 2015) showed that in the United States, in the period 2013-2015, 79% of the job seekers used online resources in their search for employment, and only around 30% utilized employment agencies, print advertisements, or jobs fairs and other events (Smith, 2015). In the EU-28 the situation is somewhat different. In 2017 only 17% of the individuals that were between 16 and 74 years old were using the internet for looking for a

job or sending a job application. In more developed countries, such as Finland, Sweden, Netherlands and Denmark, between 25 and 30% of the working age population have used the internet to look for a job. Comparatively, in developing EU countries, such as the Czech Republic, Bulgaria and Romania, between 5 and 8% of the working age population have looked for a job online (Eurostat, 2019).

Table 3. Enterprises where the website provided advertisement of open job positions or online job application, 2010 and 2018 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/eurostat)

| Country | 2010 | 2016 | Country | 2010 | 2016 |
|---------|------|------|------------|------|------|
| EU | 17 | 27 | LV | 11 | 16 |
| AT | 25 | 29 | LT | 15 | 21 |
| BE | n.a. | 41 | LU | 23 | 35 |
| BG | 16 | 9 | HU | 12 | 20 |
| CZ | 21 | n.a. | MT | 19 | 35 |
| CY | 13 | 23 | NL | 38 | 57 |
| DK | 34 | 47 | PL | 11 | 18 |
| DE | 27 | 41 | PT | 11 | 16 |
| EE | 18 | 20 | RO | 8 | 10 |
| IE | 24 | 28 | SI | 21 | 27 |
| GR | 12 | 17 | SK | 19 | 26 |
| ES | 13 | 17 | FI | 39 | 42 |
| FR | n.a. | 22 | SE | n.a. | n.a. |
| HR | 12 | 17 | UK | n.a. | n.a. |
| IT | 7 | 20 | Innovation | 22 | 30 |
| | | | Transition | 13 | 18 |

The development of the e-commerce in the last decade has determined the enterprises to shift their view and to develop websites that offer the possibility of online ordering, reservation or booking. Our findings confirm once again the main hypothesis of the study that e-entrepreneurship is more advanced in countries with more developed economies.

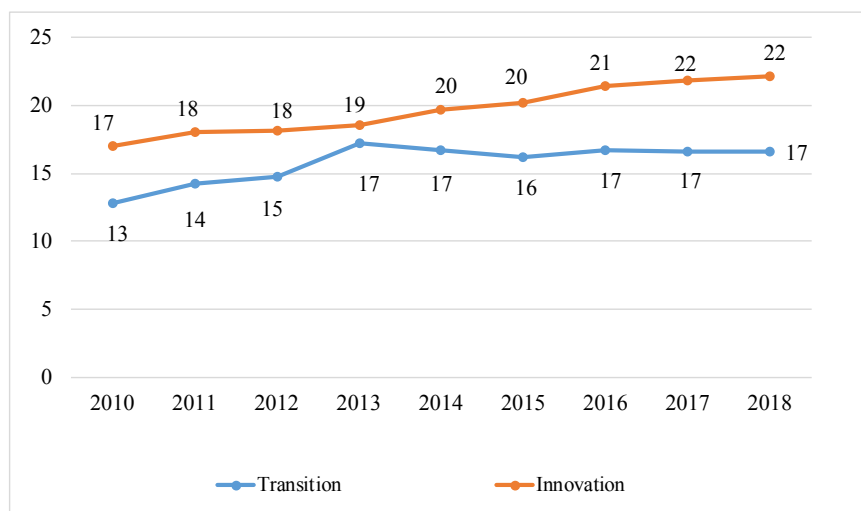


Figure 9. Percentage of EU enterprises where the website provided online ordering or reservation or booking, e.g. shopping cart, by groups of countries (Source: processed by the authors after ec.europa.eu/eurostat)

Although, the percentage of enterprises whose website provided online ordering have increased starting from 2010 for both groups of countries, in the last years have registered a stagnation. For innovation-driven countries, almost 1 from 5 enterprises offered this facility in 2018, while in transition countries only 1 from 6 enterprises (see Figure 9). The stagnation observed in Figure 9 is related to the fact that e-sales has remained at the same values in recent years. Figure 10 shows that the percentage of turnover from online selling amounted to 17% of the total turnover of enterprises with 10 or more employees. During the period 2010 to 2017, the percentage of enterprises that were selling online increased by 5% and the turnover obtained from online selling increased by 4%. In 2018 both the percentage of enterprises selling online and the turnover decreased by 1%.

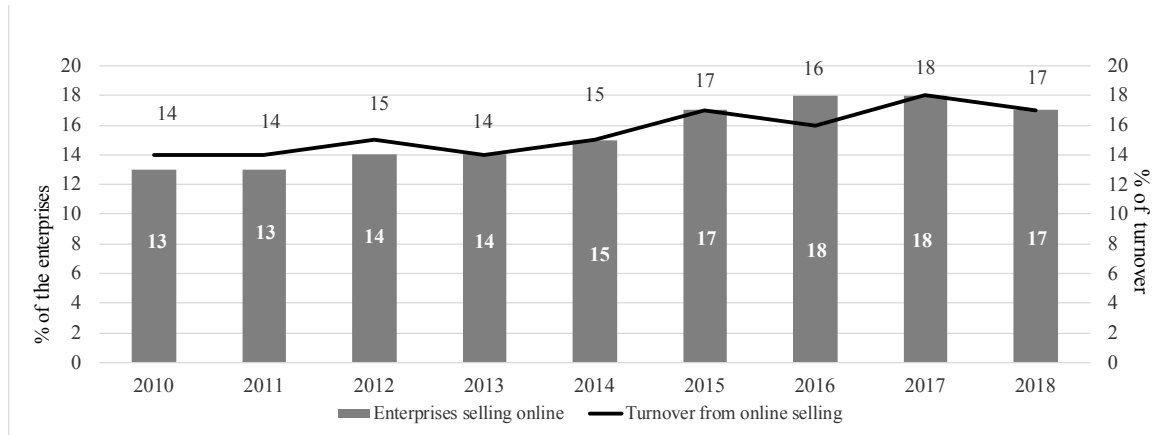


Figure 10. E-sales and turnover from e-sales for EU-28, 2010-2018 (as % of enterprises, % of total turnover) (Source: processed by the authors after ec.europa.eu/eurostat)

As Table 4 shows, for the period analysed there was a significant variation in the share of enterprises selling online and also the turnover from online selling when taking into account the size of the enterprise. Therefore, in 2018, 38% of large enterprises have sold online and have registered a value of turnover from e-sales of 24% of the total turnover of large enterprises. Also, 25% of medium enterprises have sold goods or services online and generated 13% of total turnover in this size class. At the same time, only 17% of small enterprises were engaged online selling, generating only 7% of the turnover of this category of enterprises.

Because internet users spend nowadays an average of 2 hours and 22 minutes per day on social networking and messaging platforms (according to Global Index Web, 2019) enterprises had to adapt. Thus, they have integrated social media into their business, offering on their websites links to their social media profiles.

Table 4. E-sales and turnover from e-sales by size class, EU-28, 2010-2018 (as % of enterprises, % of total turnover) (Source: processed by the authors after ec.europa.eu/eurostat)

| | Enterprises selling online | | | Turnover from e-commerce | | |
|-----------------|----------------------------|------|------|--------------------------|------|------|
| | 2010 | 2014 | 2018 | 2010 | 2014 | 2018 |
| All enterprises | 13 | 15 | 17 | 14 | 15 | 17 |
| Small | 12 | 13 | 15 | 5 | 6 | 7 |
| Medium | 20 | 22 | 25 | 11 | 11 | 13 |
| Large | 31 | 35 | 38 | 19 | 20 | 24 |

In 2018, 38% of enterprises offered references to their social media profiles, registering an increase with 16% in only four years. The average of the innovation-driven countries was situated above the EU-28 average, namely 45% of the enterprises have made references to their social media profiles (with an increase of 17% compared to 2014). In the transition economies, the increase was smaller (only by 8%) from 17% to 25% in

2018. The countries situated in 2018 on the top of the ranking, where above 60% of the enterprises offered links to their social media profiles, are Finland, Netherland and Malta. At the bottom of the ranking, we find several developing countries, such as Romania, Bulgaria and Poland.

We should also note the countries where there has been a significant increase in the percentage of enterprises that provide links to their social media profiles in the four years analysed: Finland, with a record growth of 37%, followed by Denmark with an increase of 22 % and Luxembourg with an increase of 19% (see Table 5).

Table 5. Enterprises where the website had links or references to the enterprise's social media profiles, 2014 and 2018 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/eurostat)

| Country | Website | | Country | Website | |
|---------|---------|------|------------|---------|------|
| | 2014 | 2018 | | 2014 | 2018 |
| EU | 22 | 38 | LV | 14 | 26 |
| AT | 27 | 42 | LT | 18 | 30 |
| BE | 30 | 45 | LU | 23 | 42 |
| BG | 13 | 18 | HU | 16 | 25 |
| CZ | 17 | 32 | MT | 43 | 61 |
| CY | 28 | 45 | NL | 55 | 62 |
| DK | 27 | 59 | PL | 13 | 22 |
| DE | 22 | 35 | PT | 19 | 32 |
| EE | 15 | 32 | RO | 14 | 17 |
| IE | 37 | 50 | SI | 24 | 34 |
| GR | 24 | 42 | SK | 19 | 24 |
| ES | 27 | 37 | FI | 31 | 68 |
| FR | 18 | 33 | SE | 43 | 54 |
| HR | 26 | 34 | UK | 41 | 51 |
| IT | 21 | 37 | Innovation | 28 | 45 |
| | | | Transition | 17 | 25 |

Because of the rapid growth in the use of informational technologies, the enterprises have to adapt to keep up with all the changes and therefore had to focus their attention on training the employees so that they can use information and communication technologies with ease and as efficiently as possible.

In Figure 11 we point out the significant differences that appear between transition and innovation-driven countries as regards the percentage of enterprises that provide training to their employees to develop their ICTs skills. Therefore, in developing countries the percentage of enterprises that offer training had decreased compared to 2012, in 2018 only 13% of the enterprises from the transition group of countries offered training for developing ICTs skills to their employees. For the more developed countries, the percentage of enterprises offering training has increased in 2015, with 2% compared to 2012, and after that it kept a constant value of 25% (see Figure 11).

The enterprises from European Union developing economies have to work both on preparing their employees to use the information and communication technologies and to offer better access to the internet.

Other major differences can be pointed out when we analyse the enterprises according to their size and regarding the access offered to the enterprise's e-mail system, documents or applications. In Figure 12 we observe that in developing economies, 53% of the enterprises are offering to their employees this type of access, while for developed EU economies, almost 70% have this facility. When looking at size classes, the differences are major. Small enterprises are situated below the EU average for both groups of countries. For large enterprises, the values are situated way above the average for both categories of EU economies.

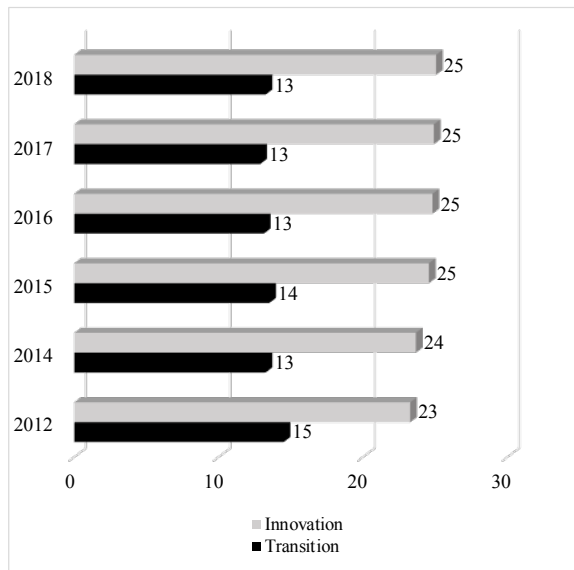


Figure 11. Enterprises that provide training to their employees to develop their ICT skills, by groups of countries, 2012-2018 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/eurostat)

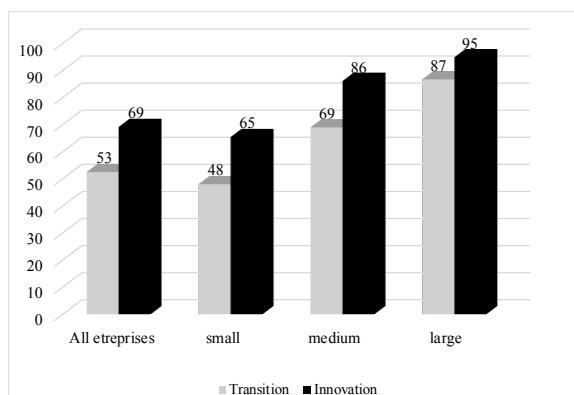


Figure 12. Provide to the persons employed remote access to the enterprise's e-mail system, documents or applications, by size class of the enterprise, 2016 (as % of enterprises) (Source: processed by the authors after ec.europa.eu/eurostat)

For identifying the positive effects generated by the use of ICTs, several studies (Dutta & Evrard, 1999; Daniel & Grimshaw, 2002; Levenburg, Schwarz, & Motwani, 2005; Ajmal, Yasin, & Norman, 2017) pointed out that by adopting and increasing the use of ICTs, especially the Internet, the firms can improve their image, communication relationships, access to information, transactions with customers and suppliers, which would help to increase sales and profit. Other studies (Kaynak et al., 2005; Szczepański, 2015) have also mentioned a set of positive effects generated by the inclusion of information and communication technologies in business activities. Thus, Szczepański (2015) shows that ICTs reduce costs for companies and governments, increase their access to new markets and also facilitates the creation of new businesses. The author points out that small and medium businesses that are on the web and who use online marketing are growing four times faster than firms that are not present on the internet. Also, businesses with a digital dimension record higher revenue and greater profitability compared to non-digital businesses. In addition, Kaynak et al. (2005) emphasize that developing an internet business has significant benefits, including establishing direct relationships with customers, suppliers, and distributors; it facilitates information transfer; allows companies to create new products and services, but also to commercialize products around the world without physically contacting customers.

The literature in the field also points out the significant relation that exists between ICTs and innovation, and the fact that ICTs implementation is an enabler of innovation in business activities. Some studies (Markides & Anderson, 2006; Sin Tan, Choy Chong, Lin, & Cyril Eze, 2009) show that ICTs are seen as instruments sustaining the development of entrepreneurs (mostly in developing countries) and also as significant factors that determine the successful implementation of radical new business strategies.

ICTs in business determine technological progress but also determine the existence of a variety of innovation potentials with positive effects on enterprises performance (Cuevas-Vargas, Estrada, and Larios-Gómez, 2016; Zoroja, 2016). For example, the use of ICTs enables firms to restructure their organizations (flattening of hierarchies and delegating responsibilities), to re-engineer business processes (like introducing just-in-time management or engaging in E-commerce) and to develop completely new products (e.g. software or online services). These complementary innovations often involve high additional expenses, such as for reorganizations and for training workers (Hempell, van Leeuwen, & van der Wiel, 2004). The study of Eranga, Kennedy, and Dushyanta (2015) shows that the implementation of ICTs stimulates and encourages all four types of innovation, namely product, process, market and organizational.

The study of Spiezia (2011) also points out the important relation that exists between the use of informational and communicational technologies in business activities and their inclination to innovate but also suggests that ICTs enable firms to adopt innovation but they do not increase their “inventive” capabilities. The results of the study pointed out that the effects of ICTs on the implementation of innovation are significantly different according to the sector of activity. Thus, for the manufacturing sector, the firms from Italy, Netherlands, and Switzerland that have a web site were 35%, 12% and 7% more likely to innovate in a process than firms with no web facilities. For the services sector, a significant effect of ICTs on innovation was found in Spain (37%), Italy (27%) and Norway (16%).

To point out the relation between the innovation in EU enterprises and the use of information and communications technologies we can also mention the study realised by European Commission, namely Innobarometer (2016). The survey shows that, in 2016, at least a quarter of the EU companies that have introduced a good or service since 2013, think public support in accessing or reinforcing selling online would have the most impact on their company. When looking at individual countries, we point out that companies in Italy (34%), Greece (33%) and the United Kingdom (32%) are more likely to say that accessing or reinforcing online selling would make a positive impact compared to countries like Malta and Luxembourg, with 12% both. Also, when looking at the size of the enterprise, the Innobarometer (2016) emphasizes that a higher proportion of smaller companies consider that public support for accessing or reinforcing online selling would make a positive impact on their businesses than larger companies (see Table 6). This result can be explained by the fact that large companies have already formed markets for their products so that a new product introduced can be easily placed on these markets. Small businesses, however, need to develop their markets so that online selling is an useful alternative.

Table 6. The enterprises that consider public support for accessing or reinforcing online selling would make a positive impact to their business, by size class (Source: processed by the authors after Innobarometer, 2016, p. 71)

| Size of the enterprise (in number of employees) | Percentage of enterprises |
|--|---------------------------|
| 1-9 | 18 |
| 10-49 | 14 |
| 50-249 | 8 |
| > 250 | 5 |

The above-mentioned report shows also that ICTs play an important role for the innovation process in enterprises, in 2016, 11% of the manufacturing companies have used IT-enabled intelligent manufacturing. For example, technologies which digitalise the production processes, as a part of the use of advanced manufacturing technologies (Innobarometer, 2016, pp. 5). Also analysing the skills required to help companies’ innovation activities, the Innobarometer (2016) highlighted the role played by the skills linked to IT and the digital economy.

Thus, 17% of all European Union companies that have introduced an innovation activity since January 2013, have mentioned these skills as important for innovation, after, marketing skills (28%), technical skills needed in the sector (24%), and financial skills relating to investment and access to finance (22%).

When asked which two of the following skills could help improve/kick start and support their company's innovation activities over the next two years, the enterprises from Malta (23%), Ireland (23%), Belgium (22%) and Denmark (22%) said that IT skills are needed to help improve or kick start their innovation activities compared to companies in Slovenia and Bulgaria, where only 9% of the enterprises mentioned IT skills among the main two needed for innovation.

Table 7. Which two of the following skills could help improve/kick start and support your company's innovation activities over the next two years? (% of enterprises) (Source: Innobarometer, 2016, p. 112).

| Country | Marketing skills | Financial skills relating to investment and access to finance | Technical skills needed in your sector | Creativity, inventiveness, experimentation | Skills linked to IT and the digital economy |
|---------|------------------|---|--|--|---|
| EU28 | 24 | 22 | 22 | 16 | 15 |
| AT | 25 | 22 | 22 | 25 | 16 |
| BE | 17 | 18 | 25 | 21 | 22 |
| BG | 20 | 23 | 18 | 18 | 9 |
| CZ | 27 | 16 | 23 | 20 | 17 |
| CY | 27 | 27 | 15 | 15 | 10 |
| DK | 22 | 12 | 19 | 18 | 22 |
| DE | 20 | 15 | 20 | 21 | 15 |
| EE | 21 | 12 | 15 | 13 | 16 |
| IE | 31 | 19 | 16 | 16 | 23 |
| GR | n.a. | n.a. | n.a. | n.a. | n.a. |
| ES | 34 | 22 | 24 | 13 | 13 |
| FR | 26 | 29 | 26 | 16 | 16 |
| HR | 30 | 33 | 21 | 11 | 13 |
| IT | 19 | 22 | 23 | 12 | 11 |
| LV | 15 | 17 | 20 | 16 | 14 |
| LT | 21 | 18 | 18 | 25 | 10 |
| LU | 30 | 20 | 19 | 14 | 15 |
| HU | 25 | 32 | 19 | 7 | 11 |
| MT | 30 | 15 | 26 | 16 | 23 |
| NL | 26 | 18 | 22 | 28 | 20 |
| PL | 19 | 25 | 23 | 18 | 12 |
| PT | 22 | 34 | 17 | 12 | 16 |
| RO | 25 | 33 | 18 | 14 | 18 |
| SI | 31 | 22 | 12 | 17 | 9 |
| SK | 21 | 22 | 22 | 19 | 10 |
| FI | 23 | 19 | 14 | 27 | 17 |
| SE | 22 | 15 | 20 | 16 | 17 |
| UK | 31 | 15 | 17 | 14 | 20 |

The fact the IT skills are among the five most important skills that can stimulate and support innovation activities in an enterprise confirm once again our second hypothesis that using ICTs in business can increase the innovative activities of that company.

These findings are sustained also by the study of van Deursen and van Dijk (2014), which has shown that all the positive and significant effects that the implementation of ICTs has on innovation might be diminished depending on the ICTs knowledge among workers. Especially in developing countries, the workers have a lack of ICTs knowledge. Thus, employees and even managers need to learn how to use ICTs and how to implement them efficiently for finding innovative ideas.

5 Conclusions

Entrepreneurship is recognised as an important driver of economic development, both nationally and regionally, through its significant contribution to creating new jobs, innovations, increasing productivity, stimulating competition and competitiveness. The adoption and use of information and communication technologies supports entrepreneurs by offering new opportunities for business development, new ways of promoting and selling products, resulting in the creation of new value. Entrepreneurs, of all sizes, are now using the internet to do business and also to reach new markets.

E-entrepreneurs benefit from more opportunities on the market but also have to face higher challenges because they are in different virtual locations, have different customers, different suppliers, but also other rival companies.

Our paper aimed at identifying the differences in the use of ICTs by entrepreneurs in European Union countries, according to the stage of economic development of countries. We also have proposed to identify the relationship between the use of ICTs in businesses and their innovation activities. For the purpose of this research, we grouped the countries by their stage of economic development. We also have analysed the data in relative values and therefore we have considered as criteria of a significant change the value of 1% of the enterprises, because this value can, for some countries, express hundreds of thousands of enterprises.

Our results confirm both hypotheses and emphasize the fact that in more developed countries the use of information and communication technologies by the enterprises is more advanced compared to developing countries. According to our findings, businesses from EU countries definitely increased their average levels of ICTs use in the period considered for analysis. Therefore, internet access is higher for entrepreneurs from innovation-driven economies, in some countries reaching even 100%. For the transition economies, the share of enterprises that have access to the internet is still below the European Union average. Moreover, surprisingly, in some developing countries was even registered a reduction of access to the internet for the enterprises, in 2018 compared to 2010. As regards the existence of a website, although the evolution is positive starting with 2010 for all EU countries, in the countries in transition the share of the enterprises who own the website is still below the EU average.

When performing the analysis on enterprises according to their size class our results were significantly different. Thus, only a reduced share of small businesses has internet access and a website. Medium enterprises are situated around the EU average as regards internet access and the existence of a website. The percentage of large businesses using e-business technologies is above the EU average. These results were influenced by the inclusion in one of the two groups of countries, pointing out that the stage of economic development of a country is a significant factor that is influencing the use of e-business by the enterprises.

Also, we found differences between the two groups of countries when we analysed the facilities offered by the website of the enterprises. Therefore, the percentage of the enterprises whose website provided a description of goods or services, price lists, online ordering or reservation or booking (e.g., shopping cart) is higher in the innovation-driven countries compared to the countries in transition. However, for both groups of countries there was an increase in 2018 (or 2016, depending on the availability of data) compared to 2010 of the number of enterprises whose website offered the above-mentioned facilities showing an increase in the use of e-entrepreneurship.

Moreover, because of the increased role of social media in the life of individuals nowadays, the

percentage of enterprises where the website had links or references to the enterprise's social media profiles has significantly increased. Also, in this case, we find differences according to the level of economic development of countries. Thus, the developed countries registered greater improvements and maintained the percentage of enterprises above the EU average, while developing countries still have values below the EU average.

The e-sales and turnover from e-sales also registered an increase compared to 2010, with significant differences between enterprises according to their size. Large enterprises registered for both indicators values more than double compared to small and medium enterprises.

There are a lot of benefits of ICTs use for businesses, especially that they can take advantage of the new production capabilities generated by the use of informational technology. Businesses are trying to adapt to the continuously changing environment by creating of new products and services, conducting innovative activities in order to compete with the other businesses and for this purpose, they are implementing and using more and more information and communication technologies. Our findings emphasize that the use of ICTs plays a significant role for obtaining innovation by firms. Therefore, the ICTs skills of the employees are very important for obtaining innovation. In this context, more and more enterprises provide training to their employees to develop their ICTs skills. The percentage of enterprises that provide ICTs training to their employees is higher in more developed countries compared to developing ones.

Our main conclusion is that businesses from EU countries use ICTs in an active way, try to create new products, and to adapt their production to their customers' needs. We also conclude that the level of economic development of countries plays a significant role in the use of ICTs by enterprises. The use of ICTs in business activities for the 28 countries of the EU have improved in the last eight years, but, taking into account that we are in a digital era, the decision-makers should continue to facilitate the use of information and communication technologies by enterprises, especially by small and medium ones.

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