

The basic characteristics of the information technology sector in Serbia

Abstract

Information technologies are the key driver of significant changes in the world economy as well as of innovation processes and the development process itself in most industrial areas and for most communities. In recent years, the rapid spread of IT has contributed to the emergence of new forms of business and business communications and IT has become a basic prerequisite for economic and social development. Modern world transformation based on IT has created the conditions for the growth of innovation and productivity, a more efficient way of connecting people and companies and the creation of new opportunities that have improved standards of living. New technologies have changed the way of life of individuals and their modes of communication and, in this way, they have ushered in a new information society. Information technology represents the fastest-growing sector of the economy of Serbia and it has thus become a leading economic driver. The main goal of this article is to indicate the basic characteristics of, and the development of the potential of the IT sector for, the Serbian economy.

Keywords: *information technology, digital economy, information society, economic development, Serbia*

Introduction

Modern society and the contemporary economy have proclaimed information technologies as the key standard bearer of innovative processes. Simultaneously, information technologies represent the basis of the developmental process in the largest number of industrial fields and in the largest part of social communities. The fantastic global expansion of information technologies in recent years has forced the subjects of economic policies to adopt new forms of conducting business with business partners and also in communicating with them. Apart from that, the population is being exposed to an ever-bigger challenge of using the internet in the realisation of their business as well as in their daily activities.

The impressive development of information technologies has contributed to a global social transformation; they have also provided a more efficient manner of connecting people and societies and have, furthermore, facilitated the improvement of living standards throughout the world. New technologies have changed individuals' way of life and their interpersonal communications, as well as the manner of work itself. Incredible technological changes have transformed contemporary society

into an information society, thus proving exactly that they represent the basis of social and economic development at the present time.

The manner, intensity and use of information technologies by one community or other are nowadays indicative of the achieved level of growth of the community itself. Precisely for that reason, data on the manner of use and the quantity of application of information technologies in Serbia show the achieved level of development, the key restrictions and the advantages of further growth in the period to come. Serbia must find its place in the unique competitive market, which it must preserve, and it is certain that it can only succeed in doing so with the help of information technologies.

The significance of information technologies for the development of contemporary economies

Economic theory and practice have confirmed that the standard of living of a society is dependent on its capacity to produce goods and services, with economic growth considered as the key determinant of this relationship. In economic literature, we may come across the most diverse classifications of economic growth factors. Technological advancement, i.e. technology, has been profiled as the factor that has the strongest influence on the existence of economic growth. Simultaneously, it has an influence on changes in the economic structure as well as on changes in the significance of other factors of development.

The well-known economic theorists Samuelson and Nordhaus mention that, irrespective of whether a country is rich or poor, the 'locomotive' of economic progress within it moves on the following four wheels (Samuelson and Nordhaus, 1994: 697):

1. human production factors (the workforce offer, and workers' level of education, discipline and motivation)
2. natural production factors (the soil, ore and energy resources, climate)
3. capital accumulation (machines, factories, roads)
4. technology (science, engineering, management, entrepreneurship).

Bearing in mind the significant role of technical progress in economic development, the need to define it becomes clear. Technical progress implies (Rosić *et al.* 1999: 47-48):

- a) a permanent process of improving the means and objects of work and energy sources, the introduction of new production methods and new ways in which to organise and manage production, in which result the social productivity of work is raised
- b) the creation of new products or new kinds of already-known products
- c) permanent modification of production technique is made either by replacing the basic means with technically more perfect ones or by rising to a higher technique by means of new investment in already-existing branches, or by building completely new economic branches.

Nowadays, the developed countries of the world have surpassed so-called industrial and post-industrial society and have now been introduced to the so-called information society. By this, we mean a society that has facilitated a huge qualitative

move in the development of social life in general and whose structure is followed by an enormous acceleration of technological changes – a reduction in spatial and temporal limits, the internationalisation of markets (globalisation) and the intensification of the global match – which have consequences for all economic sectors and which are leading towards new redistributions at economic level.

Information and communications technologies, very frequently referred to in the abbreviated form ICT (an acronym which may frequently be replaced with IT (Information Technology) and in the Serbian language with IKT (Čudanov, 2007: 11)), are being increasingly frequently mentioned in the context of business systems.

However, information society, whose achievements and conveniences have, over a longer period of time, been realized and used by countries in the developed part of the world, threatens to become a goal which is impossible to achieve for developing countries. In other words, in the history of civilisation so far, the unwitnessed speed of the development of new IT resources, as well as the speed at which current IT resources are becoming obsolete, has superficially been making it increasingly more difficult for developing countries to reach the degree of application of information and communications technologies which is the case in the world's developed countries.

Even so, one of the many characteristics of IT that gives a big and realistic chance to the world's undeveloped countries is the characteristic that they do not necessarily require a consistent and gradual continuity in application. The discrete level of hardware-software solutions enables a rapid fix connection at any level of application, even at the very peak. So, by using this characteristic of the leap-and-bound quality of IT, undeveloped countries of the world do have the chance, and in a relatively short period of time, to connect to the global market which is already now predominantly managed electronically.

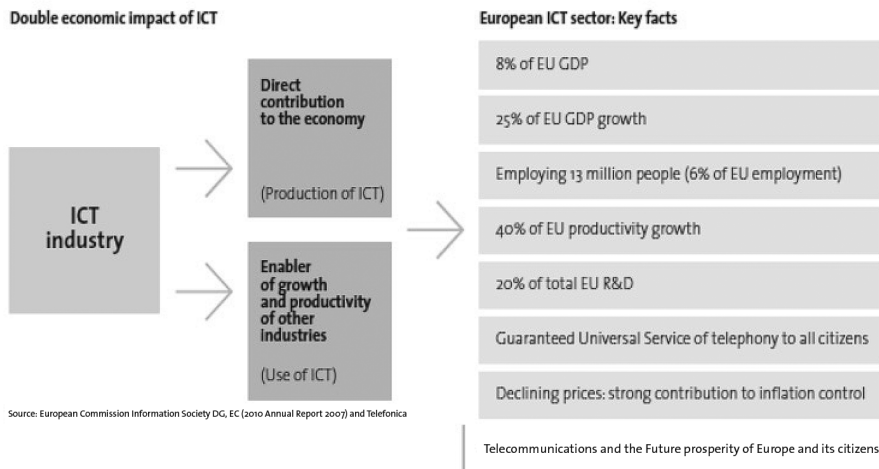
The contemporary world is faced with increasingly more frequent periods of economic instability and negative growth rates. Today, economic theory gives the role of driver of growth, productivity and innovations to IT technologies and the internet. Investments in IT are the so-called 'smart' investments that enable:

1. the creation and retention of jobs and positive economic growth today
2. the creation of the basis for sustainable growth in the future.

At the global level, the McKinsey Global Institute assesses that the internet accounts for, on average, 3.4 per cent of GDP in 13 developed countries (G8 plus China, India, Brazil, Sweden and South Korea) contributing 70 per cent of global GDP. Furthermore, the internet had – in 2011 – accounted for 21 per cent of GDP growth in the developed part of the world over the previous five years.

Figure 1 below shows the significance of IT in the development of the European economy.

Figure 1 – The significance of IT in the European Union



The basic characteristics of the information technologies sector in Serbia

The application of IT and the development of the information society in Serbia have been accompanied by the formation of various state structures, i.e. institutions which are responsible for the promotion of the use of IT, and monitoring and undertaking necessary activities for the development of the information society, i.e. the co-ordination of IT-based projects. Consequently, the Ministry for Telecommunications and the Information Society was established in the Republic of Serbia (but no sooner than May 2007). The Ministry has created national strategies for the development of the information society and has undertaken several activities related to the development of an appropriate legal framework, proposing relevant laws and regulations.

These laws include, among others relating to high-technology crime and information safety:

- Law on Electronic Signatures
- Law on Electronic Documents
- Law on Electronic Trade
- Law on Telecommunications
- Law on the Freedom of Accessing Information
- Law on the Protection of Personal Data.

In order for the information society to develop, apart from having the relevant laws and strategies in place, the number of computer and internet users – as individuals (citizens), in the business sector and within the state administration – is important. In Serbia, however, these indicators are not at a high level.

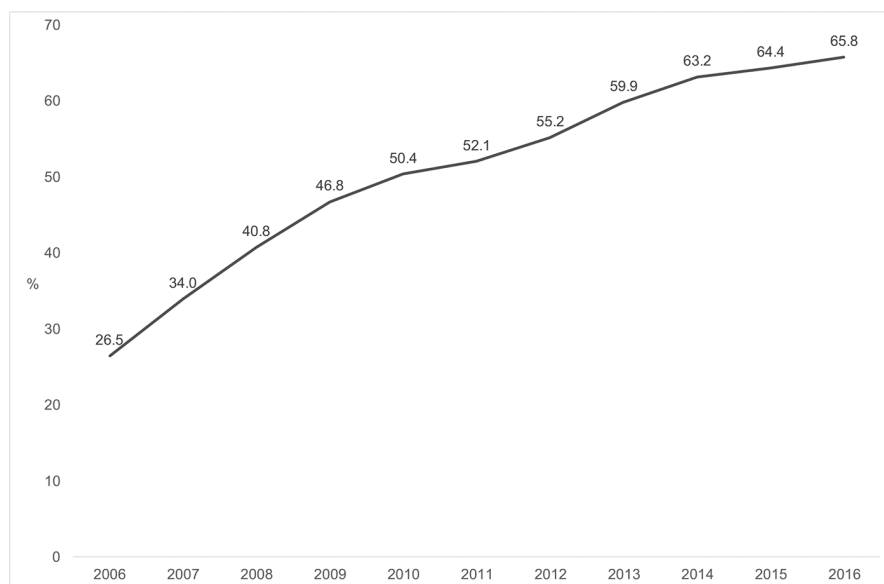
Recognising the significance of the new information technologies, the Republic Statistical Office conducted a pilot research study in 2004 on the use of information and communications technologies in organisations engaged in banking and insu-

rance. The primary goal of this endeavour was to test some methodologies and research instruments, and to prepare for the introduction of similar research studies on a regular basis relating to households and the economy (Kovačević *et al.* 2016: 3).

In the intervening twelve years, the Republic Statistical Office has conducted two research studies into the use of information and communications technologies. The first of these was related to households and individuals; whereas the second encompassed enterprises. Both studies were conducted in 2014, in accordance with Eurostat methodology, and were applied across the territory of the Republic of Serbia.

The basic findings resulting from this research study indicate that 65.8 per cent of households in the Republic of Serbia have a computer, representing an increase of 1.4 per cent in comparison with 2015 and 2.6 per cent compared to 2014 (Figure 2). The presence of computers in households varies widely across the territory: in Belgrade, it is 75.9 per cent; in Vojvodina 67.7 per cent; and in central Serbia 59.4 per cent (Kovačević *et al.* 2016: 12).

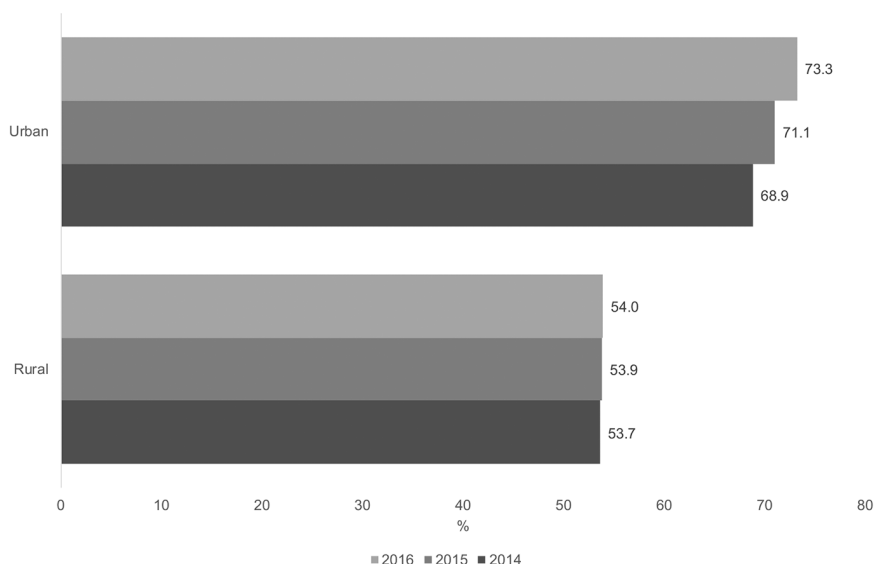
Figure 2 – Computers in households



Source: Kovačević *et al.* 2016, p. 13.

It is possible to notice the differences when a comparison is made between the presence of computers in urban and rural parts of Serbia (Figure 3): respectively, 73.3 per cent and 54.0 per cent. In comparison to 2015, this gap has slightly increased with the growth in the presence of computers in urban and rural parts of Serbia being, respectively, 2.2 and 0.1 percentage points.

Figure 3 – Percentage of households with a computer, according to type of settlement



Source: Kovačević *et al.* 2016, p. 13.

However, the biggest gap with respect to the presence of computers in households is visible in the structure of households according to salary. Computers are mostly present in households where salaries exceed 600 euros (95.0 per cent), whereas only 47.1 per cent of households with salaries of up to 300 euros have a computer (Figure 4).

Once we take a look at the data for 2015, we become aware that the gap in 2016 with respect to the presence of computers in households, according to salary, increased. This is made evident from growth rates in certain income categories for 2016 in comparison with the previous year. In comparison to 2015, the growth in households with salaries exceeding 600 euros is 6.6 percentage points; for households with salaries ranging from 300 to 600 euros, it is 1.9 points; while in households with salaries lower than 300 euros, the growth rate was actually negative, at -0.8 points.

Furthermore, some 64.7 per cent of households in the Republic of Serbia have an internet connection, representing an increase of 0.9 points in comparison with 2015 and 1.9 points in comparison with 2014 (Figure 5).

Figure 4 – Percentage of households with computer, by salary

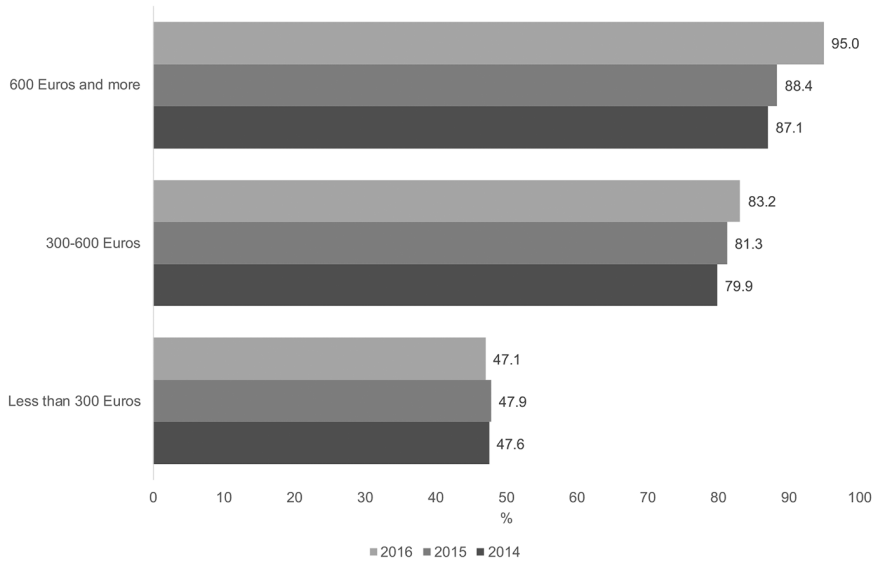
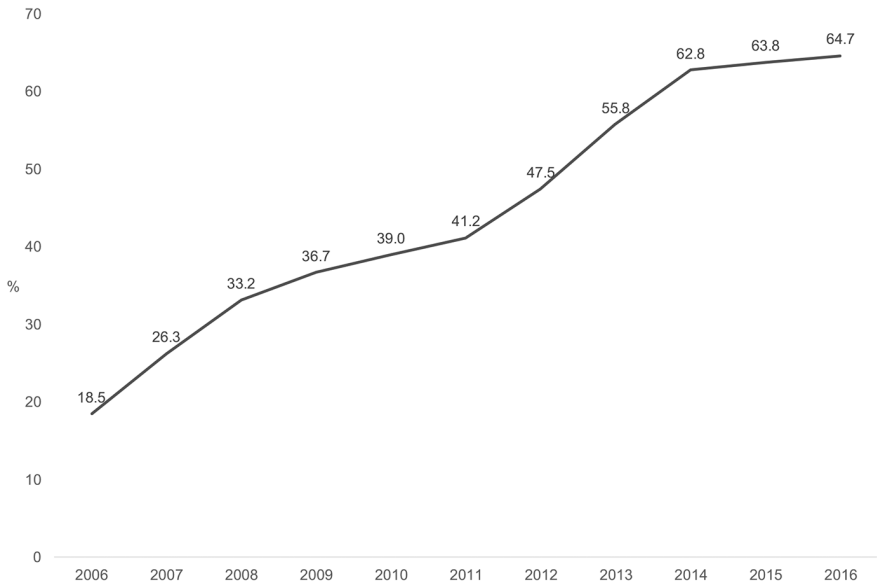


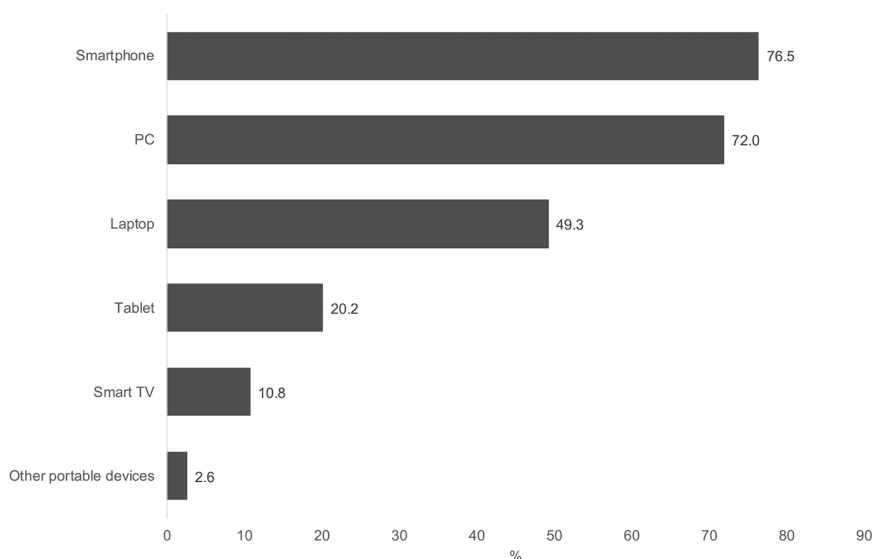
Figure 5 – The internet in households



Source for both Figure 4 and Figure 5: Kovačević *et al.* 2016, p. 14.

Where the devices which households use to access the internet are concerned, for 72.0 per cent this is their personal computer (Figure 6). Other than that, 76.5 per cent of households access the internet via their mobile phone, whereas 49.3 per cent use a laptop for that purpose. At the same time, it is notable that the number of households accessing the internet via a mobile phone increased by 8.6 percentage points in comparison with 2015.

Figure 6 – Devices enabling internet access

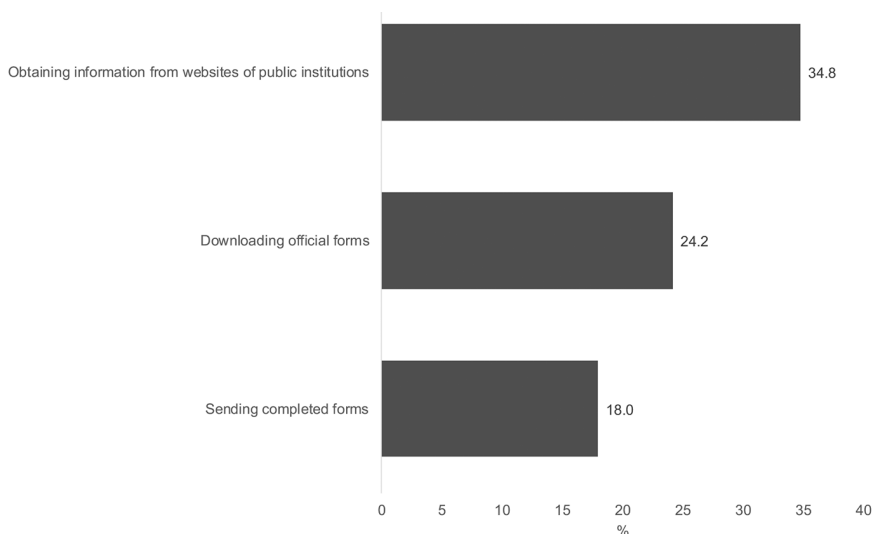


Source: Kovačević *et al.* 2016, p. 16.

In connection with the manner of accessing the internet (i.e. the type of connection), households were offered a few answers from which to select. On the basis of the results obtained, out of the total number of households that have an internet connection, DSL (ADSL) took a 45.5 per cent share; cable Internet had 45.3 per cent; and modem or ISDN connections were held by 1.2 per cent of households.

The research study shows that 28.1 per cent of respondents use the internet to gain access to public administration services instead of making personal contact by visiting offices or administrative authorities. Over 1.51m people use the electronic services offered by various branches of the public administration. In addition, 34.8 per cent of respondents who use the internet to access public administration services have obtained information from the websites of public institutions in the last three months (Figure 7).

Figure 7 – For which of the following public administration services have you used the internet?



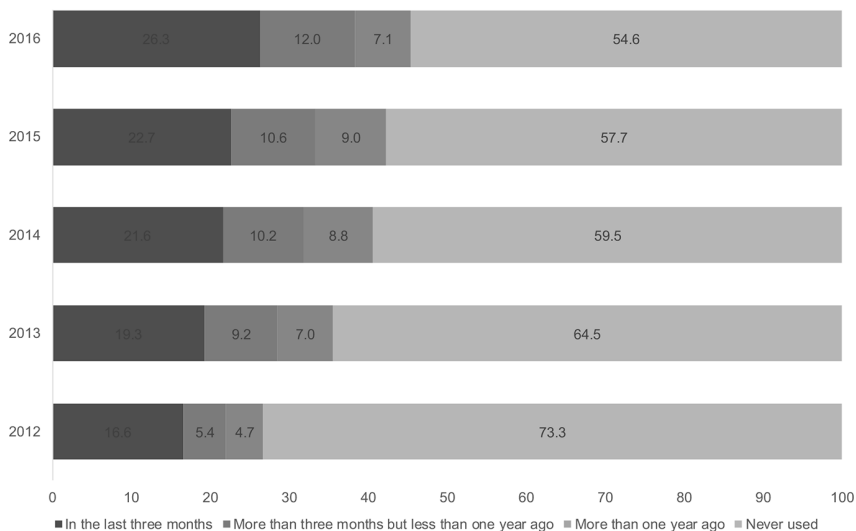
Source: Kovačević *et al.* 2016, p. 28.

When the time framework within which internet users have bought or ordered goods or services via the internet is concerned, 26.3 per cent of users had bought or placed an order within the last three months, 12.0 per cent had done so more than three months ago, while 7.1 per cent had done so more than one year ago (Figure 8). The data that, in 2016, 54.6 per cent of internet users had (still) never bought or ordered goods or services via the internet is deafening.

Over 1.45m people bought or ordered goods or services via the internet in the last year. In comparison with 2015, the number of people who bought or ordered goods or services via the internet increased by slightly more than 230 000 people.

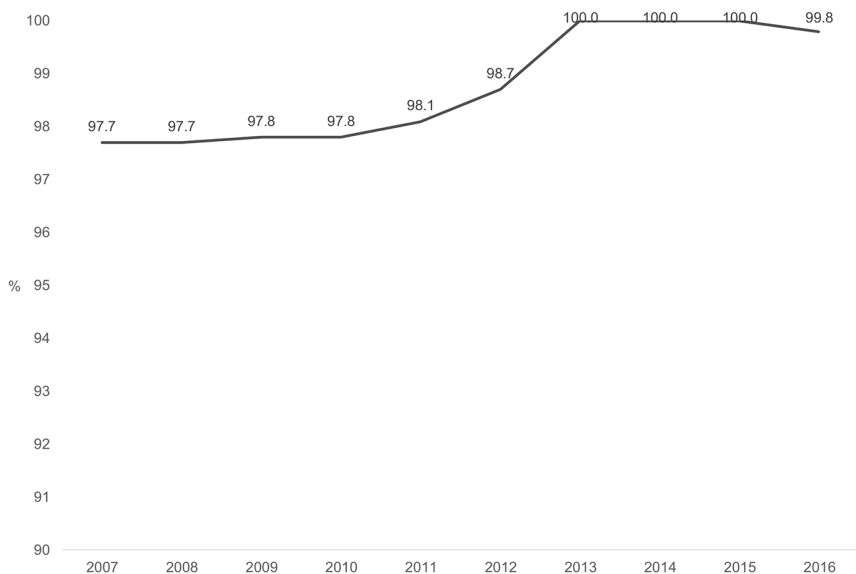
The results of the research study show that 99.8 per cent of enterprises across the territory of the Republic of Serbia use a computer in the course of their business (Figure 9). At 29.9 per cent of enterprises, one in four of those who are employed there use a computer at least once a week whereas in 38.4 per cent of enterprises, three-quarters to all of those employed there use a computer at least once a week.

Figure 8 – When did you last (for private purposes) buy/order goods or services via the internet?



Source: Kovačević *et al.* 2016, p. 29.

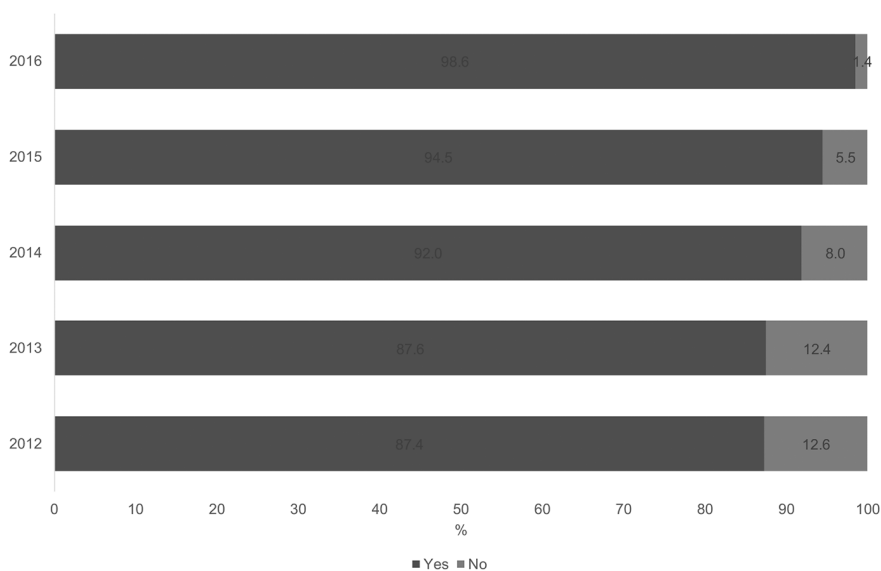
Figure 9 –Use of a computer in business by enterprises



Source: Kovačević *et al.* 2016, p. 76.

Across the territory of the Republic of Serbia, some 98.6 per cent of enterprises access public administration services electronically, an increase of 4.1 percentage points in comparison with 2015 and 6.6 percentage points in comparison with 2014. Just 1.4 per cent of enterprises currently do not make use of that possibility.

Figure 10 – Use of electronic public administration services among enterprises



Source: Kovačević *et al.* 2016, p. 80.

Analysis of enterprises according to business activity shows that enterprises from within the field of construction use electronic public administration services the most (100% of them did so).

Among answers to the question ‘For which purposes does the enterprise use the electronic public administration services?’ the most frequent are as follows: (Kovačević *et al.* 2016: 80)

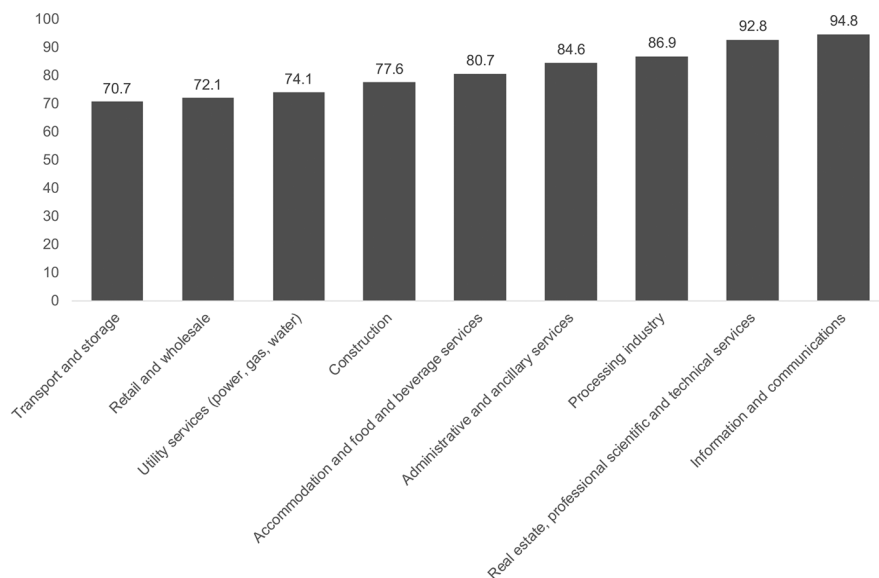
- for obtaining information – 96.2 per cent
- for obtaining forms – 96.6 per cent
- for returning completed forms – 95.7 per cent.

Where websites are concerned, 80.8 per cent of enterprises have a website, which is an increase of 5.6 percentage points in comparison to 2015 and 6.8 points in comparison to 2014. When we look at the structure of enterprises according to their size, the following results are obtained:

- 93.9 per cent of large enterprises have a website
- 89.8 per cent of medium-sized enterprises have a website
- 77.9 per cent of small enterprises have a website.

Enterprises in Serbia that have a website are set out, according to line of activity, in Figure 11:

Figure 11 – Enterprises with a website, by broad economic sector



Source: Kovačević *et al.* 2016, pp. 81-82.

Social networks have also been increasingly present in enterprises' approach to doing business. This is supported by the results of the research study which show that some 36.1 per cent of enterprises had used some social network in conducting their business activities.

Information technologies as a new source of economic growth in Serbia

Serbia is faced with tendencies towards recession and a long, and not always successful, process of transition reforms. The key outcomes of the transition of the Serbian economy can be stated quickly:

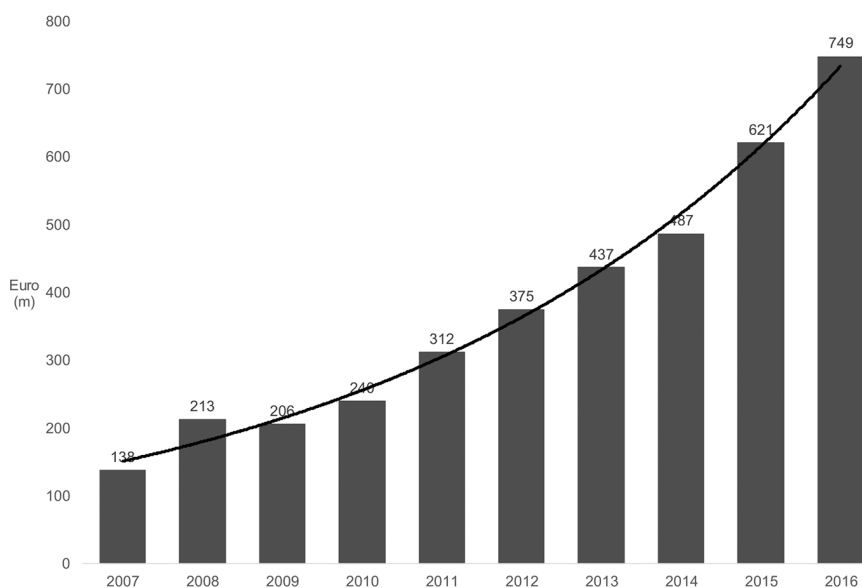
- falling economic growth rate
- a large number of unemployed workers
- poor export results
- growing budgetary and balance-of-payment deficits
- overall dissatisfaction of the population and a fall in their quality of standard of living.

According to official statistics, traditional sectors dominate the list of the most attractive sectors in which investments may be made, and the IT industry has certainly been one of the most attractive sectors in recent years. Simply put, however, this industry is neither sufficiently capital- nor labour-intensive to be listed among the most at-

tractive sectors (according to level of investment and number of newly-created jobs). Yet, judging by the number of foreign companies that have already established software development centres in Serbia, as well as those domestic ones that provide software development services for foreign markets, this sector is exceptionally dynamic.

In recent years, a dynamic increase in the export of services has been present to a significant extent, which has resulted in the appearance of a more significant reduction in the current balance deficit. The biggest contribution to these positive changes has been made by the export of IT services, for which Serbia has become recognisable (Figure 12). Official statistical data prove this assertion to the extent that the export of IT services even exceeds the export of agricultural products from Serbia.

Figure 12 – Exports of IT sector in Serbia (€m)



Source: http://nbs.rs/internet/cirilica/80/platni_bilans.html

On the basis of Figure 12, it is possible to notice clearly that, in a period of no more than a single decade, exports of the IT services sector has increased by a factor of more than five – from €138m in 2007 to €749m in 2016. Otherwise, the telecommunications, computer and information services sector has been recording the most dynamic growth in the value of exports made in the Serbian services sector since 2007.

An increase in the exports of the IT services sector is of multiple significance for the Serbian economy. First of all, it has a positive influence on the balance of payments; there is high newly-created added value; and there is also an improvement in Serbia's international image – it has been recognised by foreign investors as a country that has quality human capital. It is exactly such a development of the IT sector that has been contributing so impressively to the quality of economic growth in Ser-

bia and an increase in productivity, as well as the creation of new jobs – predominantly highly-skilled ones. Knowledgeable assertions are that 50 000 to 100 000 new jobs could be created in the field of information technologies in Serbia by 2020; while the state has set the goal of increasing the export of services in the IT sector to €1bn by the same year.

In Table 1, and to point towards the conclusions of our study, we present a SWOT analysis of the IT sector in Serbia.

Table 1 – SWOT analysis of the IT sector of Serbia

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ local IT market quite developed in certain fields (banking, electronic transactions and communications) ■ strong IT research and the basis of skills in the university sector; one-third of graduates are from technical universities ■ establishment of new IT ministry in government ■ significant presence of computers in households, representing growth potential ■ low levels of IT services and software represent growth possibility and will be fastest-growing segments by 2018 	<ul style="list-style-type: none"> ■ limited purchasing power represents a restricting factor for growth ■ in the main, development of IT market is intended for exports not domestic market ■ non-existence of appropriate legislation ■ lack of computer literacy among government officials as well as among the population ■ lack of capital ■ high import customs for certain IT products
Opportunities	Threats
<ul style="list-style-type: none"> ■ candidate status for EU membership encourages institutions and companies to invest in IT and thus meet market requirements and ensure competitiveness ■ government working on implementation of e-Government and computerisation of all programmes at national and regional levels ■ more favourable loans from banks, as stimulation for enterprises and domestic IT sector ■ EU development programmes will encourage greater application of IT in Serbia ■ strategic geographical position in Europe could enable Serbia to become outsourcing hub in IT sector. 	<ul style="list-style-type: none"> ■ low salaries and lack of infrastructure ■ lack of real political will and strategic development path for IT sector ■ government savings measures slowing down development of IT sector ■ failure of privatisation of Telekom Serbia represents limitation on development of internet infrastructure.

Source: Embassy of Belgium, 2015, pp. 11-12.

In the last few years, together with education and development, information technologies have been recognised by the state as providing a significant opportunity for the development both of society and of the Serbian economy. The Serbian informat-

ics market is characterised by fast growth (Chamber of Commerce and Industry of Serbia, 2016):

- in the period from 2001 to 2008, that growth was over 15 per cent per annum
- in the period from 2008 to 2010, the IT market lost one-quarter of its value
- in the period from 2001 to date [i.e. 2015], the share of equipment right across the market has been reduced but, unfortunately, it still accounts for 61 per cent of total market value. This shows that the Serbian services market remains quite undeveloped.

IT consumption per capita is also used as one of the indicators of the achieved level of market development. This was around €62 in 2015, against an EU average of €600. In order for us to reach a market size of at least €1bn, consumption per capita needs to double. IT can be said to represent a sector from which is much expected in terms of being the key bearer of economic growth and development for Serbia.

It should be absolutely clear that, in order for the scope of the activities of the IT sector and the growth of its exports to increase, it is necessary that the number of experts in this field should also be continuously increased. However, an increase in the number of experts in the IT field does have its limitations. These limitations are, first of all, personified in the demographic factor (the present trend towards a decrease in the population) and, in accordance with that, a reduction in the percentage share of the young who are talented at and interested in IT, as well as the emerging limitations due to the restricted capacities of the education system.

Recently, there has been a significant increase in the level of interest of young people in studies from within the domain of the IT sector. It is immensely important that the popularisation of these studies does not contribute to a decrease in the quality of education. In that context, it is justifiable for the state to contribute, via increased investment, to an increase in the capacities among the existing faculties regarding the training of IT experts. Apart from that, the international exchange of teaching staff from within this field needs to be improved so that the quality of studies could be improved in that way.

Conclusion

The dynamic economic changes caused by the exponential growth of knowledge have been key determinants of the past few decades. The development of human societies based on this has, as a consequence, pronounced and accelerated our scientific-technical and technological progress. The functioning of systems of business has also been made more difficult by the growing complexity of business endeavours and the interconnectedness of phenomena and events taking place inside the business system itself and in the wider environment.

In parallel with the growing influence of digital technologies, new challenges which cannot be reached by knowledge, creativity, capability and an aspiration for change also grow. Today, the difference in the achieved level of development of states, social groups or individuals is directly proportional to the difference in the degree of the application of information technologies, and so no country should allow itself to be excluded or marginalised. Countries, i.e. their governments, must actively and quickly act towards reducing differences in technological development (in relation to the world and to Europe) because the process of the transformation from the industrial society into the information society is, in developed countries, at an advanced stage.

Digital gaps – differences in the level of application of information technologies and electronic transactions – are present not only between a developed country and a transition country, but also between urban and rural environments, large and small companies, etc. Therefore, effective national strategies for the development of the telecommunications infrastructure and a good legal and institutional framework, as well as permanent activities towards improving knowledge and raising the level of awareness that the world is entering a new era of development, which can ensure the further mitigation of digital gaps, are going to be necessary.

Many indicators indicate that Serbia is, mainly, at the beginning of the development of the information society and that it needs to overcome yet many obstacles, from the development of the infrastructure, via a greater availability of hardware and software potential, to the necessary level of educational development. In addition, the experience of developed countries teaches us that new goals, which represent an imperative of the time, must always be added to the existing ones. The most significant place in the hierarchy of goals certainly belongs to a general request for the faster development of science and for the quicker application of scientific achievements in the economy, while information technologies represent a very clear incentive to the acceleration of economic development.

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