

**INNOVATION IN ICT AND ECONOMIC DEVELOPMENT IN  
THE REPUBLIC OF MACEDONIA  
Vera Naumovska, PhD**

***Abstract***

*Modern technical – technological changes have enormous influence on the economic development in every country and also all over the world. Today, ICT (Information-Communication Technologies) enabled every kind of information to become accessible to every individual, everywhere in the world. The traditional industries, the financial sector, services and all other sectors became more effective and more efficient, which is due to introducing ICT products in their own processes and activities. ICT is both a separate sector which absorbs a great number of the active population belonging to different professional vocation on one hand, and also an industry which produces a wide variety of products (hardware and software) for all other industries.*

*But, all the countries in the world do not have a completely implemented and integrated ICT that will be on a satisfying level. ICT implementation procedure includes four main areas: 1) regulatory environment and industrial framework; 2) internet infrastructure; 3) e-government and 4) e-education. All these areas will be referred to in the content of this paper. Also, this paper should present the efforts the companies and the society make in order to incorporate themselves in the digital processes and to integrate in the information society.*

**Key word: innovation, e-readiness, digital economy, economic development**

**Introduction**

Innovations and very fast implementation of ICT resources undertaken by the companies are reengineering their business processes, change the communication between employees inside the companies and outside with suppliers, customers, agencies and other third parties using intranet, extranet and internet. This transformation led to having digital economy, information economy, internet economy, web economy, network economy, new economy, knowledge base economy and resulted in the society becoming a postindustrial society, a knowledge base society or an information society. This is case with the developed countries. But, developing countries and undeveloped countries also tend to implement ICT resources. The level of ICT implementation is not satisfactory because all their economic power is not developed enough. That is case and with RM (Republic of Macedonia).

**1. Innovation in ICT**

The goal of innovation defined as a common term means undertaking a continuous change for the purpose of making someone or something better. The care for innovations in global is agenda to authorities of developed countries. EU with communications (COM(2005)0488; COM(2006)502 from 13.09.2006; COM(2007)-“Lead market initiative for Europe”; COM(2008)-Towards on increased contribution from standardization to innovation in Europe”, for eHealth, bio-based products, protective textiles, recycling and renewable energy

managed it to better development. We can say that ICT is part of innovation; it changes everyday and enables the information to be accessible to everyone, everywhere and at every instance (24/7/365).

Innovation in ICT has led to many visions for creating channels of interactive communication between the entities: the citizens, the governments and the businesses. ICT is a broadly used term that can encompass many technologies used to produce, process, exchange and manage the information and knowledge. The effects that the ICT has on different type of innovations are taken into consideration, being the following ones: 1) process (speed and reliability of business processes; automation; information management; organizational change; and 2) process and product innovation (new products and services; customization; new bundling offering; 3) rational innovation as number of indicators describing innovations in relationships with customers and suppliers (number of customers and suppliers; change in value per customers; value of purchase per supplier; share of retained customer; number of repeated supplier). In general, it associates to computers, software, peripheral devices and connection resources to the internet.

With the intensive development of ICT, starting from 1990s, above entities tend to have benefit from communication networks - internet, intranet and extranets, and the economy such as common expression of all activities of the companies is called digital economy, information economy, e-economy, web economy, network economy, internet economy, knowledge-base economy and so on. The society in these conditions is called postindustrial society, information society, knowledge-base society and so on.

Not all countries have the same intensity of development (social and economic) and the same ICT implementation in their own environment. The developed countries still dedicate remarkable attention to practicing – establishing new innovations in ICT, although it has been implemented in many parts of everyday life. That is not the case with many developing and undeveloped countries. They must implement ICT, because if not aiming to do so, it is likely that they will encounter poor economy with businesses subjected to bankruptcy, growth of unemployment and population experiencing poverty. As it is immanent that the developed countries continually follow news and implementation of ICT innovation, it also appears to be a case with the undeveloped counties, although not to that extent. Therefore, there exists a digital gap or differentiation between countries, regions, or continents. The high level of implementation and inclusion of ICT requires regulation (in EU (with many projects, directives, action plans as e-European information society, 1999), Russia (e-Russia program for implementation of ICT, 2002-2015), even and RM (National strategy for Information Society, 2005) and so on). The EU countries through European Council in 1999 adopted an initiative called “e-Europe information society for all”, action plans “e-Europe 2002” & “e-Europe 2005”, an initiative “i2010 – A European information society for growth and employment”, lunched at 2005, which has brought them high economic growth and social prosperity, broadband internet for all and single European information space with aims to create a modern, market-oriented regulatory framework for the digital economy”. The high speed internet is the passport to the information society and essential condition for economic growth. EU has stimulated broadband

internet with the following three tools<sup>1</sup>: 1) telecom rules for more competition and investment, 2) a new system to stimulate mobile satellite services which can deliver broadband via satellite across the EU, 3) reform of radio spectrum to free resources for new wireless services. Today only 7% of EU's citizens are still not connected with fast internet (some rural areas) and in Denmark, Luxemburg and Belgium are covered 100%. Also, e-businesses are following with measures of two groups of indicators i.e. 1) percentage of enterprises tools turnover to e-business / e-commerce and 2) with composite index to reflect the companies level of readiness to engage in the more complex e-business environment.

The number of home-computer owners in EU is the highest in urban places, mainly typical for highly-educated persons and households with children (70%). The number of companies with internet access in Eu-10 amounts 93% whereas the number of employees using the Internet is 95%. Republic of Macedonia belongs to developing countries that tend to follow the EU institutions which have programs and projects for ICT implementation. Republic of Macedonia is working systematically in order to implement ICT. It prepared "e-declaration 2002" for developing IS (Information Society) and digital economy, National strategy for development of IS (2004), Law on Telecommunication (2005), E-signatures, Law on E-communication (2005), Law on Forms of Data (2001), Law on E-commerce (2007) , Law on Free Access to Public Information, Law on Interception of Communication and so on.

The Government of RM is making efforts to enable higher level of ICT usage in many ways such as: computer for every child at schools, vouchers for every student in final year of university education (during 2007 and 2008), trainings for citizens who are retired and unemployed (2007 and 2008) through clubhouses center or e-points, (project titled "Macedonia-country of IT professionals"), the Government team with group of businessmen (IT professionals) had visited Silicon Valley (2008) with goal to animate US IT companies (Oracle, Sun Micro Systems, Intel, Howllet Packard) to establish business communication with IT companies from RM ( IT company Seavus opened office in Silicon Valley - San Francisco), and to consider the possibilities for FDI (foreign direct investment). The central government with help of USAID<sup>2</sup> has good implementation of ICT: it introduced e-tax (<http://e-tax.ujp.gov.mk>) - 90% of companies are already registered in the information system and 70% of their monthly tax return is submitted online; students submit online applications for dormitories and students' loans and scholarships ([www.raspredelba.gov.mk](http://www.raspredelba.gov.mk)); e-procurement for speed and simplicity for indisputable evidence of quantitative savings and transparency ([www.e-nabavki.gov.mk](http://www.e-nabavki.gov.mk)); online applications for new jobs in governmental institutions (<http://eprijava.ads.gov.mk>); services for enabling e-payment for governmental services and answer to citizens' questions to government ([www.uslugi.gov.mk](http://www.uslugi.gov.mk)); budgets users submit their budget requests through the system ([www.e-budget.gov.mk](http://www.e-budget.gov.mk)); online distribution of internal cargo transport licenses through Ministry of Transport and Communication ([www.mtc.gov.mk](http://www.mtc.gov.mk)); interoperability with Ministry of Interior Affairs, Central Registry, Pension Fund. With all the above presented effort, RM achieved in the first quarter of 2008<sup>3</sup>, a computer usage in households of 45.6% and internet connection of

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<sup>1</sup>/ Broadband Internet for All Europeans: Commission lunches debate on future of Universal Service, Brussels, 25 September, 2008, IP/08/1397, p.1,

[http://ec.europa.eu/information\\_society/policy/ecomm/current/consumer\\_rights/universal\\_service/index\\_en.htm](http://ec.europa.eu/information_society/policy/ecomm/current/consumer_rights/universal_service/index_en.htm)

<sup>2</sup>/ US Agency for International Development, [http://macedonia.usaid.gov/English/EG/ebiz\\_eng.htm](http://macedonia.usaid.gov/English/EG/ebiz_eng.htm)

<sup>3</sup>/ Statistical data enclosed on website [www.mio.gov.mk/statistics](http://www.mio.gov.mk/statistics)

29.4%; without its efforts these percentage would have been smaller (this is data from State Statistical Office on [www.mio.gov.mk](http://www.mio.gov.mk)). But this does not appear to be satisfactory when compared to Slovenia that in 2006 had 65% of households using computer, 40% of broadband connection and 40% users of internet, which is much better result than the result of RM nowadays).

## **2. ICT and Economic Development**

Today, the benefit of the ICT resulted in the Republic of Macedonia becoming an information society and having digital economy. It is essential and unavoidable that the economy has continuous economic development, which is partnership between government, and its institutions and agencies, private firms and non-profit sector. ICT sector represents a big part of the industry with software applications, system's software products and information equipment (computers, printers, routers, modems, external memory network components, web tools, hosting, satellites, security, e-payments), and ICT human resources. IT products are implemented in all other sectors, starting from agriculture and ending with all kind of services, it helps for having effective, productive and efficient economy. ICT occupations include many wide spectra of hardware and software areas, information management systems to web variety of vocations. Implementing the IT products led to traditional sector in developed countries becoming subjected to redesigning and this transformation led to introduction of new terms: e-business, e-commerce, e-marketing, e-payment, e-banking, e-finance, e-procurement, e-fulfillment and so on. Prefix "e" is present everywhere ICT are implemented, because its activities are expressed in bits, not on papers. Also, the communication between different departments is made by making use of intranet, the communication with suppliers and customers is made via extranet and internet. Internet is a network which enables every unit and every company to be available and to have the world on its hand. ICT usage depends on:

- capital resources- investment in connection to internet hardware and software components)
- people with remarkable e-skills - implementation and usage of the internet and computers, demand for trained and skilled citizens and employees with technical and information background
- technological base- internet requires three main components: infrastructure, computers and network-communication technologies
- national needs- ICT and internet are implemented for the purpose of achieving better economic and social condition of the countries, and competitive advantages for the businesses.

The economy consists of more entities beginning from business, commerce, finance, and all other areas of production and services whose everyday e-working is not only installing a web server and web site, but making complete change of all working processes to the claims of digital economy - from reengineering of internal, business processes to e-connection with suppliers, customers and third parties. It can be done with the compny's own staff or by outsourcing.

Everywhere in the world, the attention is put on SMEs which are mainly flexible firms, which accept innovations very easily. That is the case with Canada (more than 90% of Canadian

firms are small and medium size, and they created 36% of new jobs in the Canadian economy between 2002-2004)<sup>4</sup>. In EU 20 million SMEs provide 65 millions jobs<sup>5</sup>.

The micro, small and medium size enterprises are dominant type of enterprises in the Macedonian economy. They are newly founded during the transition period over the last decade of the 20<sup>th</sup> century. The transition period resulted in the enterprises' transformation from self-management system towards market economy, which was not very successful, because during the transformation, majority of existing companies went into bankruptcy. SMSEs (the small and medium size enterprises) as newly established, operate nowadays and some of them even started to develop and to grow. It is assisted by USAID (e-biz project in the e-biz centers which offers high impact of the ICT applications, which help for achieving fast improvement of SMSEs' competitiveness in entire clusters or industries), and Government National SMSEs' Development Strategy (2002-2013) including, a 2007-2010 Entrepreneurship, Competition and Innovation Development Program. Macedonian IT sector belongs to SMSEs companies (about 250 companies and all of them are start-up companies) with 2 to 50 employees. Mostly IT companies resell hardware or provide fairly low margin services and software solutions on the Macedonian markets or to Macedonia's surrounding environment (Kosovo, Serbia, and Albania). Macedonian IT market in 2007 was \$121 million worth, and this was due to the demand in the education sector that was invested in by the Government, then the demand of the companies and finally the households. IDC (International Data Corporation) estimated that from the total IT expenditure 2/3 belong to hardware, 1/5 to IT services, and the last place belongs to software<sup>6</sup>. In RM at 2007<sup>7</sup>, 90.7% of the enterprises with 10 and more employees used computers and 73.3% had access to internet. Only large companies in the RM had internet usage 97.4% (with 98% internet usage in businesses are Ireland, Japan, Finland, Swaziland, Denmark and Austria<sup>8</sup>). When it comes to the web sites, only 53.8% have websites which are most frequently being used for advertising, less frequently for products' presentation with catalogues and rest for price list and providing after sales support (data from State Statistical Office on [www.mio.gov.mk](http://www.mio.gov.mk)). In general, USA is benchmark for ICT and e-business usage and also a competitor on global markets. That was shown with the survey<sup>9</sup> (2007) on differences between EU and US companies when it comes to ICT usage and e-business. In order to compare ICT and e-business performance of EU and US companies on an aggregate level, average values were calculated for 16 indicators in the area of infrastructure, e-procurement, internal e-operations and e-sales. EU companies were found to lag 11 to 15 percentage points of infrastructure, e-procurement, and e-sales. The overall use of internal e-operations was found to be very similar in EU and US companies. This is mainly due to the larger level of ERP use in the EU-7.

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<sup>4</sup> / "Industry Canada, small Business Quarterly, Vol 5, No4, Feb, 2004 in Final Report "Canadian e-business initiative", Sep., 2004, p., [www.cebi.ca](http://www.cebi.ca)

<sup>5</sup> / "Helping SMEs win in the Information Society",

[http://ec.europa.eu/information\\_society/tl/ecowor/smes/index\\_en.htm](http://ec.europa.eu/information_society/tl/ecowor/smes/index_en.htm)

<sup>6</sup> / "Macedonian IT market worth \$121 million in 2007", [www.masit.org.mk/?Macedonian%20ICT%20market](http://www.masit.org.mk/?Macedonian%20ICT%20market)

<sup>7</sup> / <http://www.mio.gov.mk/?q=node/276>

<sup>8</sup> / "The Future of the Internet Economy: A Statistical profile", OECD Ministerial Meeting, 17-18 June, 2008, p13

<sup>9</sup> / "E-business adoption in Europe and the USA",

### 3. ICT Education and E-readiness

ICTs are immanent in every parts of the world, because they influence as dominant power in management with economical, political, cultural and society development and help for achieving irreproducible – enormous growth of speed, quality and popularity of informatics products. That can be improved with data from the world statistics, where, the needs for implementation of ICT products are being identified in all parts of the world. Therefore the growth of internet users from 2000-2008 is obvious (it is highest in Africa with growth of 1031.2% - because the base in 2000 is low and the continents with high base in 2000, such as Europe and North America is lower, but still important 266.0% and 129.6% respectively a growth of users)<sup>10</sup>.

As the world statistics shows, about 81.5% of internet hosts belong to G7 countries which include 10% of world population and about 0.65% of all hosts belong to countries with greatest number of population (India, China, Nigeria, and Brazil).

Three basic components for using internet (telephone, computer-modem and electricity) are available and present in RM, whereas the fourth one i.e. knowledge in English is not at satisfactory level. Fourth component is very important because a big number of operation systems and application softwares are still in English. Due to this a new term appeared - informatisation – which means changes, because it includes IT which is digital divide present among countries, continents, regions and inside between population between these segments. The digital divide is connected with stature-age and education and the percentage of users of internet is 3 times bigger in population at the age from 15-24, and also from 55 to 64. In the RM<sup>11</sup> (2007), the users at the age from 20-29 used internet 28%, from 30-39 were 13% and from 40-49 were 10%, and with those users above the age of 50 the percentage significantly falls. The percentage is higher when it comes to persons with higher level of education, and lower with persons with lower level of education. The students account for 30% users of computers and employees account for 54%. Also, the level of urbanization divide the users: rural parts of the country have smaller degree of acceptance of ICTs. The bridging of digital gap between population and the businesses in RM, the central government is making efforts to increase the level of citizens' ICT skills for everyone older than 18, through ICT courses in club centers (e-points) in rural and urban areas with poor development; free internet clubs, introducing information subject in elementary, secondary and higher education, given vouchers as help for students who are in their final year of studies.

### 4. Digital Economy and the Businesses

The digital economy expresses summary results of all business activities in general, through economic indicators referring for the overall economy. ICT sector as a separate sector with its own development supports all the others sectors, so the businesses are now e-businesses. We came across the term e-commerce, which means buying and selling online. Broad definition of e-commerce is “any use of information and communications technology by a business that helps it improve its interactions with customers or suppliers”. The broad definition of e-business as “automated business processes (both intra-and inter-firm) over computer mediated

<sup>10</sup>/ “Internet usage Statistics”, <http://www.internetworldstats.com/stats.htm>,

<sup>11</sup>/ <http://www.mio.gov.mk/?q=node/276>

networks"<sup>12</sup> and includes: B2C: business and consumers (their customers); B2B: business to business, e.g., where one business buys supplies from another or buys products to resale; G2B: businesses to government, where perhaps businesses conduct transactions electronically with government regarding various business licensing or reporting requirements or where businesses sell products or services to governments. Its main characteristics are: information, knowledge, and speed. It is possible to be realized using digital technologies, digital communication networks, computers, software and other components of ICT. We also need to mention life-cycles for e-business and e-commerce, which have had their ups and downs. It is generally accepted that e-business and e-commerce cross through several stages: "e-business 1.0" (1995-2000), where the companies were buying all sorts of immature technology; "e-business 2.0" (2002-2005), focused on cutting costs with conservative attitudes towards ICT; "e-business 3.0" (2006- until nowadays), where business models are change with e-strategy. Here e-business models are driven by market developments and competitive demands. In global level (2007/2008) main competitors are USA, EU-25 and country notably from Asia.

In traditional businesses, the companies used physical equipment for better production processes which added new products or new value to existing products and had a their own channels in communication for minimizing the risk from competitors.

Digital knowledge base economy and digital information include: 1) Digital services and products and 2) Physical products which sell on internet. That means now we have two types of companies: a) pure virtual dot.com sell digital products with digital content (software, music, articles of scientific journals, e-books, newspapers, magazines, movies) and can be fulfilled electronically-online. Its costs are for internet communication, hosting, web application, e-payments and hardware, b) physical dot.com (brick-and-click sells products in physical form with physical content and must be sent to customers offline. The costs, for these products are same as for digital plus including the costs for fulfillment, distribution, coordination in shipment and payment and quality control.

The different level of ICT implemented online working has three ways of e-transactions:

- offline- transactions are being made via e-mail and the delivering is traditional
- online –for digital products, the orders, shipping and payments are electronically, and if the product is in physical form, the fulfillment is physical, the payment is made electronically, whereas the delivering from seller to customer and the accepting of the physical products by the customer is traditional.

No matter whether the ICTs companies (micro, small, medium or large) are from IT sector or any other sectors (primary, secondary or tertiary sector), the performance of companies is based on a combination of four sets of indicators: 1) productivity (labour productivity and operational costs); 2) growth (revenue from sales and profitability); 3) innovativeness (investment in innovation and investment in ICT) and 4) competitiveness (competition on price and competition in quality).

Productivity changes are estimated by retailing gross outputs to changing labour costs and other costs (operational).

Growth is estimated on the basis of changes in revenues from sales as well as changes in profit margins.

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<sup>12</sup>/ What is "e-Business"?, [http://www.ebusiness-watch.org/about/what\\_is.htm](http://www.ebusiness-watch.org/about/what_is.htm)

Innovativeness is assessed by estimates on the relation between capital investments in innovation in general and ICTs especially.

Competitiveness is assessed by relating the importance of competitions on quality and on price in relation to changing market shares.

Labor productivity- investment in ICT is crucial for labour productivity growth

Operational costs - ICT has stronger effects on decrease rather than increase of operational cost.

Revenue from sales - almost half of the companies experienced an increase in revenues due to ICT and other factors.

Profitability - significantly contribute to improving profitability.

Investment in innovation - capital investment of firms in innovation is broadly defined as technology renewal and re-engineering of business processes and organization.

Investment in ICT- ICT investment takes up a substantial part of the efforts of firms to modernize.

Competition on price - price competition plays a crucial role gaining market shares.

Competition on quality - ICT is driving force for competition on quality. The loss of market share is a result of competition on quality.

### **Conclusion**

Over the last decade the ICT and internet have brought about significant changes in the economies and societies. The ICT and Internet revolution is not over. In the next years the internet will become much faster due to the rollout of very high speed broadband networks and this will permit the launch of many new interactive media and content services. The internet will also become more pervasive; available anytime and anyplace due to the widespread development of low cost wireless broadband and the merging of fixed and wireless communications.

Europeans have massively adopted broadband and internet services. This is changing the economy and transforming lifestyles. But the benefits of these significant changes for the European economy will only be unleashed if several challenges are tackled. First the internet economy must be kept open, notably to innovative business models. This requires the continuation and reinforcement of the current pro-competitive regulation of e-communications markets and appropriate consumer safeguards. Secondly, equipping networks for the internet of the future will require: major investments in infrastructure to create a high-speed internet; the development of the internet architecture to meet future needs; and more access to spectrum on a flexible basis to allow wireless services to take to the air. Third, the exponential increase in internet use will raise security and privacy challenges.

RM belongs to developing countries. The main reasons are transition processes in last decade on 20 century. But in this first decade of 21<sup>st</sup> century, special in its last quarter do effort for high economic development. RM has not forces to be innovator in ICT, but to use amenity of ICT is easier and do it. With many ways for education of population to be closer to computers and internet which were presented in separate parts of this paper, with ICT companies which offer ICT equipment and some software as outsourcing and cover the countries of close environment help for higher growth of economy. But, the general world economic crises in this

period is one very unfavorable conditions which influence on chosen way toward better and competitiveness economy.

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