ACQUISITION OF ICT BY BUSINESS IS A TOOL FOR IMPROVEMENT OF COMPETITIVENESS

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Abstract
The paper contains the characteristics and analysis of degree of acquisition of information and communication technology by business in Baltic Sea region states. European e-Business Readiness Index is applied with the purpose to compare ICT acquisition by business in the countries and to evaluate achievements and weaknesses. Regression analysis is applied to prove connection between degree of development ICT and the country's competitiveness rank and also between ICT adoption and its usage by business. Particular attention is devoted to problem areas of ICT application by business in Latvia. The paper provides recommendations aiming to improve competitiveness of business in Latvia.

Key words: *information technology, European e-Business Readiness Index, broadband, internet, enterprises, competitiveness.*

Introduction

Information and communication technologies are a powerful driver of growth and employment. Differences in economic performances between industrialised countries are largely explained by the level of ICT investment, research, and use, and by the competitiveness of information society and media industries. ICT services, skills, media and content are a growing part of the economy and society ("i2010 – A European Information Society for growth and employment, 2005). ICT accounts for half of the rise in EU productivity and available high-speed broadband is a key to new jobs, new skills, new markets and cutting costs. It is essential to businesses, public services and to making the modern economy work ("Europe's Digital Competitiveness Report, 2009).

The aim and tasks of the research

The author of the article have chosen 27 UE countries and particular seven Baltic Sea region countries (BSR) with the purpose to analyse the extent of acquisition of ICT by business, to analyse the impact of ICT to competitiveness of business and to make certain conclusions regarding improvement of competitiveness Latvians business.

The following tasks were set:

- To analyse, how ICT facilitates competitiveness of the country.
- To analyse, how ICT adoption by companies stimulate commercial activity
- To make conclusions regarding opportunities of Latvian companies to improve acquisition of ICT and therefore to improve competitiveness of Latvians business.

Materials and Methods: monographic method, statistical analysis of data and expert method.

ICT improves competitiveness of countries economies

Nowadays both public and private sector leaders now accept the important role of ICT in stimulating growth and enabling the development of economies by significantly increasing productivity across sectors and industries. Many economies have been able to leverage the extraordinary power of ICT as a driver of change, modernization, and competitiveness (Irene Mia, Soumitra Dutta, 2009)

The Global Information Technology Reports (GITR) series provided by World Economic Forum since 2001 have evolved into one of the world's most respected international assessments of countries' capacity to leverage technology for increased competitiveness.

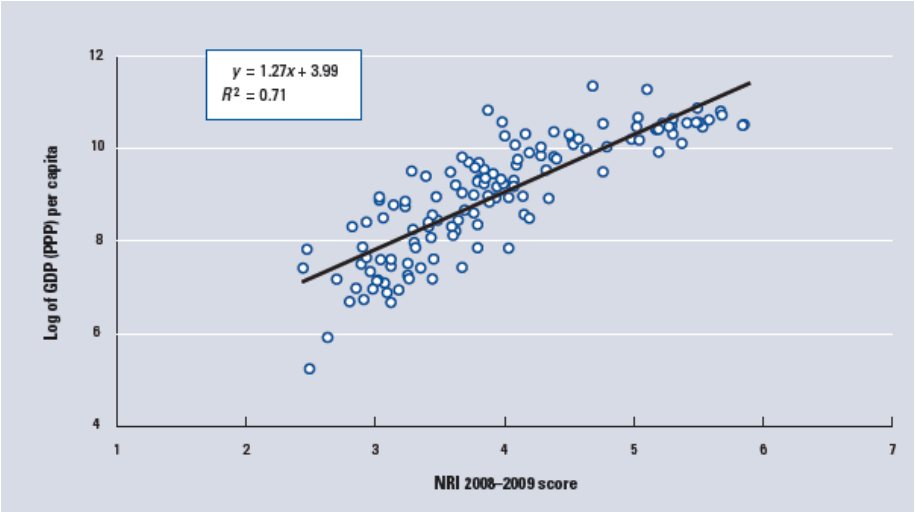

Figure 1: Networked readiness and GDP per capita for 134 countries, 2007. *(The chart is drawn by Irene Mia, Soumitra Dutta, "Gauging the Networked Readiness of Nations: Findings from the Networked Readiness Index 2008–2009")*

Networked readiness index (NRI) composed of three subindexes, assessing respectively ICT environment, readiness, and usage, is evaluated by annual GITR. The regression in Figure 1 shows that GDP increases, if grows the NRI of the country.

The evidence of impact of ICT to economics of the countries is a correlation between Readiness component of NRI and the Global Competitiveness Index of 134 countries. In its turn the regression in Figure 2 demonstrates a very high value for R2 and shows that Global Competitiveness Index (Claus Schwab, Xavier Sala-i-Martin, 2009) increases significantly, if grows the readiness to use ICT means.

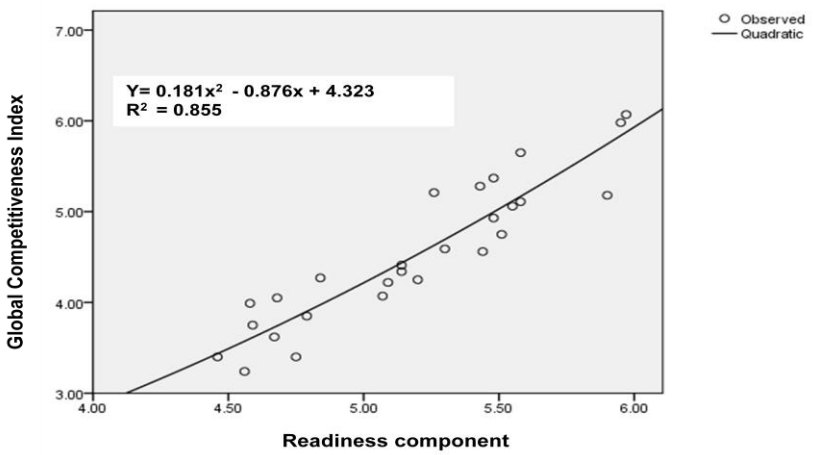

Figure 2: Global Competitiveness Index dependence of Networked readiness index for 27 EU countries *(drawn by authors using data of The GITR 2008–2009", INSEAD and Global Competitiveness Report 2009–2010", World Economic Forum)*

Usage ICT by businesses provides positive effect at commercial activity

The e-Business Watch defines e-business as "automated business processes (both intra and inter firm) over computer mediated networks", following a definition proposed by the OECD. Automation means that formerly manual, paper-based processes or exchanges are partly or fully replaced by digitally processing or exchanging the same data.

Therefore E-business is not primarily about systems and technology. It is about optimally managing relationships with customers, suppliers and business partners in a complex and often global competitive environment (Selhofer, Lilischkis, Woerndl, Alkas, 2008). Although companies use ICT mostly with the purpose to improve process efficiency (mainly conceived as ICT for cost cutting), ICT are increasingly recognised as an important tool for innovation and increasing revenues by enabling new services and new ways of working within value networks.

Making studies in 2007/08 e-Business Watch revealed such main e-business trends:

From transactions to service provision: Companies are increasingly devoting attention to using e-business for better service to their customers, with the goal of creating sustained relationships with them. Significant improvements in connectivity serve as a base for this trend. For example, connectivity has increased strongly, with the percentage of enterprises having a broadband connection climbing from 62% in 2005 to over 81% in 2008. Less progress, on the other hand, has been made in the area of electronic transactions. Only 12% of total enterprise turnover is made online, an improvement of only 2 points with respect to 2005. Therefore, while connectivity is now high, the actual implementation of use of ICT in business processes, especially those involving relations with customers and suppliers, remains limited (i2010 - Annual Information Society Report, 2009).

ICT for information management and transparency of processes: The trend towards focusing on customer services, increasing the efficiency of internal processes remains an important objective for ICT. While having a webpage is quite common among EU businesses (64% penetration in 2008), availability of services through the internet is limited and this applies especially to those offering a high value added to customers. In particular, while 57% of websites contain product catalogues and/or price lists, 26% allow for online ordering/booking and a mere 10% for payment (i2010 - Annual Information Society Report, 2009).

Outsourcing and e-intermediaries: ICT and e-business open up new opportunities for outsourcing specific business processes. The study on ICT, innovation and firm performance concludes that outsourcing is probably a key factor for growth in labour productivity. ICT has a double role to play in this context. A good ICT infrastructure facilitates the outsourcing of business processes, while parts of the ICT infrastructure and maintenance itself can be outsourced.

In 2007/8 e-Business Watch conducted a total of 89 case studies in 38 countries. The studies demonstrate pervasive examples of successful implementation of e-business. For example, e-banking use has risen from 70% in 2005 to 78% in 2008 (i2010 - Annual Information Society Report, 2009). Nowadays e-banking is supported by advanced ICT solutions, which enable most everyday banking services to be conducted online. Thus, most of the traditional manuals banking services are performed by customers online, while more sophisticated services are still performed in the branch bank. The customer takes advantage of the low-cost nature of e-banking and the face-to-face advisory services of the branch bank. In Latvia in 2009 the number of e-banking clients increased by 32% in comparison with 2007. The number of electronic transaction exceeded 90% of all transaction, but in some leading banks, for example, in Swedbank it was 97% in 2009 (Euro Data, 2009).

The other example is deploying RFID (Radio Frequency Identification) by a number of enterprises. RFID is used in logistics and freight transportation from vehicle tracking to warehouse processes optimisation and reusable assets tracking, but also in passenger transportation, due to the increasing deployment of RFID in contact less smart cards for payments. Take-up is also high in retail trade (27%) and in manufacturing 25% (i2010 - Annual Information Society Report, 2009). The studies reveal that RFID implementation payback within 3 years is achievable. For small-scale scenarios and niche business process optimizations, for example IT asset tracking and logistics asset tracking applications, a payback period of 1 year is possible (RFID Adoption and Implications, 2008).

Considering the ways, how to promote ICT uptake by enterprise and especially by SME, the e-Business Watch derives suggestions for policy actions. The policies playing a particularly important role are as follows: ICT standardisation policy, ICT skills policy, and promoting industry value chains and SME (Selhofer, Lilischkis, Woerndl, Alkas, 2008). The importance to stimulate ICT adoption by SME and to motivate the integration of SME into digital value chains was highlighted by "A cross sector e-Business Watch study" provided in 2008 (Erber, Keser, Nepelski, Swaminathan, 2008). All named policies are also important for Latvian enterprises, because without common standards computerised systems remain stand-alone and unable to exchange data with each other in house or externally. Educating ICT professionals, educating ICT users, and providing adequate information about ICT and e-business to managers is also the actual issue for Latvian companies. Thus it is necessary to undertake efforts at European level, nevertheless, Latvian policy makers also can contribute in promotion of mentioned policies.

Latvian companies have opportunities to improve acquisition of ICT means

The e-Business Readiness Index has been developed aiming to use a universal measure or index that allows to rank member states and to make comparisons among them and with the advanced world countries. The e-business readiness index is one of the policy sub-indicators selected by the Council Resolution of 28 January 2003 (5197/03) of the European Union to monitor progress in the implementation of the e-Europe 2005 Action Plan (Castaings, Tarantola, 2008). The goal was to reduce the complexity of the underlying concepts of electronic business by condensing different aspects into one final metric (A guide to ICT Usage Indicators, 2005).

Eurostat and National Statistical Institutes developed "e-Commerce and ICT usage of enterprises" survey, a comprehensive statistical yearly data collection exercise, which was endorsed by the legal basis EC (2004)808 in April 2004. This annual survey aims to produce harmonised and comparable statistics on the European enterprises use of ICT systems. The survey measures the level and the type of the ICT used by European business. For this reason the indicators of the e-Business Index are grouped into two categories measuring the various components of a country's technological development: 6 basic indicators for the group "Adoption of ICT by business" and 6 basic indicators for the group "Use of ICT by business" (Castaings, Tarantola, 2008). (See table 1 and table 2)

Table 1: 2008 e-Business readiness Index: list of basic indicators for adoption of ICT (the source William Castaings, Stefano Tarantola, (2008))

Code	Adoption of ICT: basic indicators
a1	*Percentage of enterprises that use Internet*
a2	*Percentage of enterprises that have web/home page*
a3	*Percentage of enterprises that use at least two 2 security facilities at the time of the survey*
a4	*Percentage of total number of persons employees using computer with their normal work routine*
a5	*Percentage of enterprises having broadband connection to internet*
a6	*Percentage of enterprises with LAN and using an Intranet and Extranet*

Table 2: 2008 e-business readiness Index: list of base indicators for use of ICT (the source William Castaings, Stefano Tarantola, (2008))

Code	Use of ICT: basic indicators
b1	*Percentage of enterprises that have purchased products / services via the internet, EDI or any other computer mediated network where these are >1% of*

	total purchases
b2	*Percentage of enterprises that have received orders via the internet, EDI or any other computer mediated network where these are >1% of total turnover*
b3	*Percentage of enterprises whose IT systems for managing orders or purchases are linked automatically with other internal IT systems*
b4	*Percentage enterprises whose IT systems are linked automatically to IT systems of suppliers or customers outside their enterprise group*
b5	*Percentage of enterprises with Internet access using the internet for banking and financial services*
b6	*Percentage of enterprises that have sold products to other enterprises via a presence on specialised internet market places*

The components indicators (CI) in the article are aggregated using a participatory weighing scheme described in "The 2007 European e-Business Readiness Index", where weights were assigned to the indicators according to a "budget allocation scheme". More comprehensive description of method for calculation of CI one can find in the joint OECD/JRC handbook (Michela Nardo et al, 2005).

The data used throughout the analysis refer to the European businesses of different sizes and sectors of economic activity covered by the 2008 Community Survey on ICT Usage and eCommerce in Enterprises. The model of survey was developed by Eurostat in close collaboration with Member States and the OECD.

The scores for the Adoption and Use of ICT (see table 4) provide a relative assessment of e-business progress in 27 EU Member States. The indices for Adoption and Use for the aggregate EU27 are calculated from component indicators estimated by Eurostat. One can see that quantitatively the countries scores are much lower for Use than for Adoption.

Table 3: 2008 e-Business Readiness ICT Adoption and Use scores. (Drawn by authors using data of Information Society statistics, Eurostat)

Country	**Austria (AT)**	**Belgium (BE)**	**Bulgaria (BG)**	**Cyprus (CY)**	**Czech Republic (CZ)**	**Denmark (DK)**	**Estonia (EE)**	**Finland (FI)**	**France (FR)**	**Germany (DE)**	**Greece (EL)**	**Hungary (HU)**	**Ireland (IE)**	**Italy (IT)**	**Latvia (LV)**	**Lithuania (LT)**	**Luxembourg (LU)**	**Malta (MT)**	**Netherlands (NL)**	**Poland (PL)**	**Portugal (PT)**	**Romania (RO)**	**Slovak Republic (SK)**	**Slovenia (SI)**	**Spain (ES)**	**Sweden (SE)**	**United Kingdom (UK)**	**European Union (27 countries) (EU)**
ICT Use	35.75	35.26	17.44	24.96	28.15	41.65	25.45	32.91	29.57	39.28	28.27	17.47	38.07	29.4	19.74	29.64	33.51	29.32	40.58	22.88	32.79	17.78	27.13	27.16	25.75	36.96	35.75	31.48
ICT adoption	65.68	71.09	45.79	55.85	62.55	72.76	63.80	75.78	66.10	66.51	60.13	52.23	64.73	60.13	48.51	52.10	66.39	62.41	70.79	52.46	56.93	36.24	64.04	64.00	62.21	74.18	65.72	62.27

The countries from the northern part of Europe steadily occupy the top ranks and have consistently done so for the last 3 years. The leading position of Denmark for ICT use is really outstanding. Together with the Mediterranean Member States, most of the states from the Eastern part of Europe, which joined the EU recently (2004 and 2007), are still in the developing stage of their e-business environment.

For an appraisal of the variability of the performances achieved by the different countries, an estimate of the probability density function using the Member States for ICT Adoption is provided by Figure 3. The distributions is characterised by a negative skew (elongated tail at the left) that pronounces an important and heterogeneous group of countries lagging behind (increase of the mass of the left tail of the distribution) for ICT Adoption.

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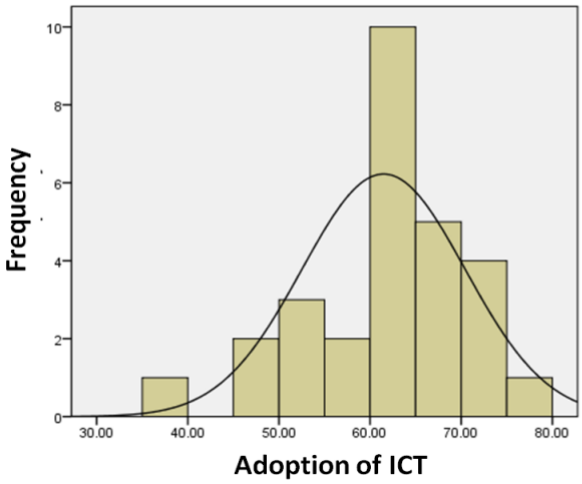

Figure 3: Probability density estimates for Adoption country scores. (Drawn by authors using data of Information Society statistics, Eurostat)

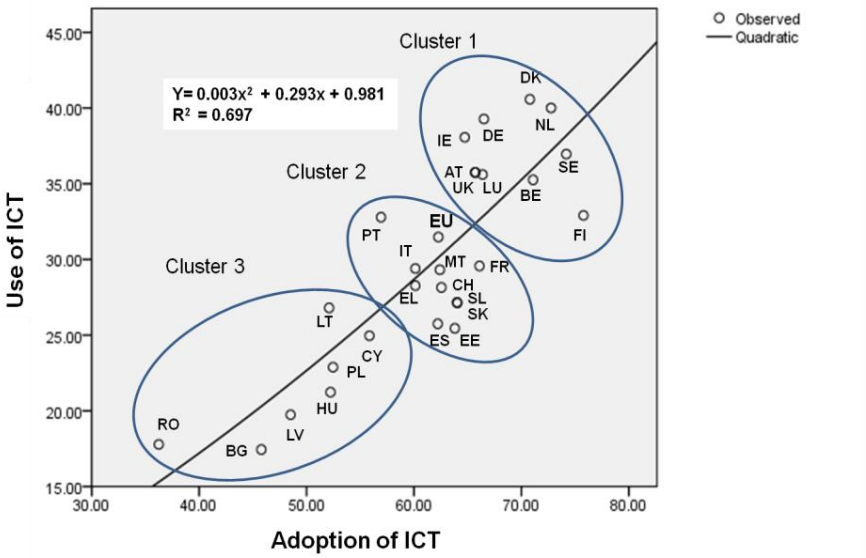

Figure 4: Adoption scores vs. Use scores 2008*. (Drawn by authors using data of Information Society statistics, Eurostat)*

A graphical representation of Adoption versus Use scores for the 27 countries is proposed by Figure 4. The correspondence between the country codes with the full names is given by Table 3. Using the EU27 aggregate, the plane is divided in 3 parts characterising the practical use of the adopted ICT infrastructures. Mentioned above the 3 clusters categorize the performances of the countries with respect to the EU27 average estimated by Eurostat.

The figure 4 reveals considerable correlation between Adoption and Use scores (r = 0.697). Looking at the previous studies good performances in ICT Adoption are coming along with a satisfactory level of ICT Use (Castaings, Tarantola, 2007). With respect to the EU27 average, Portugal can be distinguished for its efficiency in using ICT infrastructures given the investments made.

Nordic countries are essentially composing the cluster of countries leading for both Adoption and Use of ICT (cluster 1) together with the Netherlands, Germany, Belgium, Ireland, UK, Austria and Luxemburg. The second cluster composes countries with rather similar performance, which is close to EU27 average, but nevertheless is below of it. The cluster 2 form some countries member of the former EU15 (mostly Mediterranean countries Greece, Italy, and Spain), also Estonia, Slovakia, Check Republic and Slovenia, who joined the EU in 2004 and reached a relatively fair level of ICT Adoption and Use.

The third cluster is composed of countries that recently joined the EU (2004 and 2007), which have performance ICT Adoption and Use significantly below EU27 average. Lithuania and Cyprus are the leaders of that group, Latvia takes place in the middle, but Romania and Bulgaria lag behind.

Comparison Adoption of ICT by 7 Baltic Sea Region (BSR) states reveals that variable "*Percentage of enterprises that use Internet*" (a1) shows the highest result and is almost similar among the BSR states (see figure 5). The largest diapason of performance appears for the *"Percentage of enterprises that have web/home page*" (a2), where performance of Latvia is two times less than result achieved by Denmark. The lowest results BSR countries show regarding variable "*Percentage of enterprises with LAN and using an Intranet and Extranet*" (a6), were the result of the leader, Finland, is 30%, but performance of Poland is only 7%. Latvian enterprises show the worse results almost in all cases excepted variables "*Percentage of enterprises having broadband connection to internet*" (a5) and "*Percentage of enterprises with LAN and using an Intranet and Extranet*" (a6).

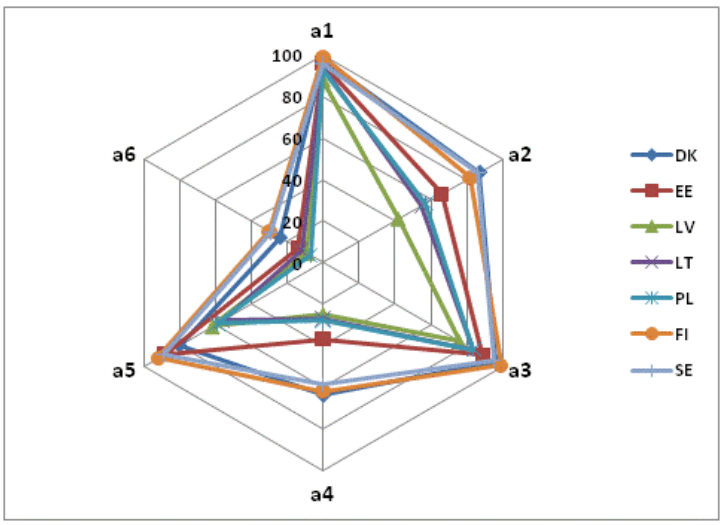

Figure 5: Adoption of ICT by 7 Baltic Sea Region states in 2008. *(Drawn by authors using data of Information Society statistics, Eurostat)*

The figure 6 demonstrates considerable progress achieved by Latvian enterprises in *Use of ICT* in last 2 years that permitted to reduce a gap with the neighbors. Nevertheless Latvia still remains the laggard among BSR countries thus having opportunities for improvements. Despite the steady progress in *Adoption of ICT* Latvian companies did not diminish backwardness, but the gap with Estonia and Lithuania even increased.

A recent study "Latvian Entrepreneurship Environment's Appraisal and Reform's Report" provided on behalf of Ministry of Economics of Latvia pointed at some drawbacks in adoption of ICT by government institutions and in application ICT means for communication

with enterprises. While tax electronic declaration demonstrates significant progress (57% in 2009 in comparison with 27% in 2007), the customs electronic declaration did not progress since 2005 still remaining only 3%. Moreover willingness of state and local administration to communicate with business by e-mail has diminished so, if in year 2007 75% of respondents received the answers on their e-mails, but in 2009 that figure reduced by 67% (Animus Account, 2009).

Thus the author of the study made several proposals. One of them recommends "to develop e-government services, information exchange, submitting and exchange of documents", but the second one: "to extend the list of procedures, which would be possible to implement in electronic way (Animus Account, 2009). Therefore likely use ICT by public administration for communication and for provision of services encourages adoption ICT by business hence saving of time and resources becomes obvious.

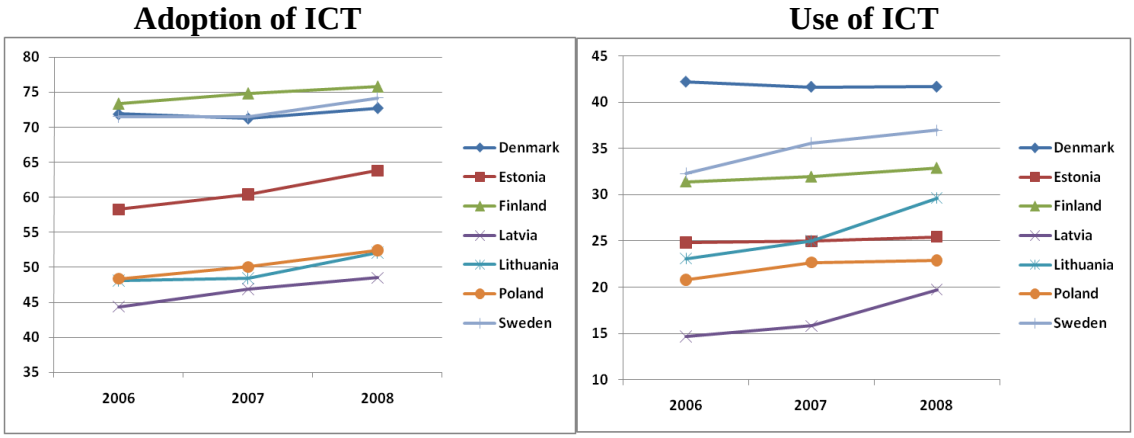

Figure 6: Adoption and Use of ICT by 7 Baltic Sea Region states in 2006-2008. *(Drawn by authors using data of Information Society statistics, Eurostat)*

Conclusions

The article provides an evidence of positive correlation between application of ICT in both public and private sector and economics growth. Moreover use of ICT facilitates competitiveness of the country.

Usage ICT by businesses provides positive effect at commercial activity by improvement in customer services, by increasing the efficiency of internal processes and by employing the opportunities for outsourcing specific business processes. The use of modern technologies such as RFID opens new opportunities for firms in different industries, for example, for business process optimizations and for IT or logistics asset tracking applications.

The e-Business Readiness Index has been used by the article author with the purpose to assess use ICT by Latvian companies and to clarify Latvia position among EU countries and particularly among Latvia neighbours. Analyses of e-Business Index reveals that Latvia takes place in the middle of the third (weakest) group of EU countries. Despite considerable progress achieved by Latvian enterprises in *Use of ICT* in last two years that permitted to reduce a gap with the neighbors Latvia still remains the laggard among BSR countries thus having opportunities for improvements.

The author of the article recognizes that Latvian policy makers can contribute in acquisition of ICT by business in two ways: first, by development of policies that promote more effective application of ICT and, secondly, by promotion of e-government services, exchange of electronic documents and electronic exchange of information with business.

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