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ICT Impact on Competitiveness: The Case of Private Sector in Lithuania

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Abstract

The private sector has had to change and renew business practices in order to survive in the context of intensifying globalization of national economies. Information and communication technologies (ICT) are well known as key technologies to promote competitiveness and economic growth in the private sector. Although it is known theoretically that ICT contributes to companies by providing more visibility, more information, lessening barriers in the market and facilitating financial operations, the impacts of ICT use on private sector are various and with diverse aspects. Therefore, in this paper we extend an existing approach to ICT economic impact areas by proposing a complex view on the subject and reasoning the main theoretical impact areas of ICT. The paper aims to develop and propose conceptual ICT impact model, integrating three dimensions – performance, growth and innovation, and empirically validate it in the case of private sector in Lithuania.

Keywords: ICT impact model; private sector; competitiveness; economic growth

1. Introduction

In recent years, analyses on the impact of ICT on business and economic environment have been widely addressed by policy makers, technology developers, and science and business societies more and more often. The information and communication technologies are developing rapidly. Development of information and communication technologies and development of knowledge society are main priorities of creation and development of knowledge economy in European Union. In Lithuania government notably supports ICT development in both private and public sectors despite the fact that private sector also tends to invest to ICT. It is necessary to note that the Government of Lithuania implemented various means related to ICT development. During the period of 2008-2011 384.89 million Lt. were invested to creation and development of information technologies (further: IT). Every year Government of Lithuania and European Union (further: EU) significantly supports investment to information technologies – approx. 200 million Lt. According to data of Lithuanian Department of Statistics (Statistics Lithuania) (2013), a number of enterprises using ICT for business operations increased in 2013: 39.6 per cent used enterprise resource management (RMS) system and 20.1 per cent used a customer relations management (CRM) system, whereas in 2012 enterprises used respectively 23.1 and 17.7 per cent.

It is known that the adoption and use of ICT represents fundamentals of competitiveness and economic growth for companies, organizations and even countries that are able to exploit them. (Vehovar & Lesjak, 2007; Higon, 2011; Ollo-Lopez & Aramendia-Muneta, 2012; Steinfield, LaRose & Chew, 2012). However, it is difficult to identify and measuring impacts in any area but for ICT there are added complications because of its diversity and rapidly changing nature.

Therefore, the aim of our research to develop and propose conceptual ICT impact model, integrating three dimensions – performance, growth and innovation, and empirically validate it in the case of private sector in Lithuania. The proposed model construction is based on a literature review and systematic analysis.

2. Literature review on ICT development in private sector

According to e-Business Watch (2010), it is well known that ICT plays a dual role:

- ICT as a global technology because it is used in all sectors, evolve over times and enables various innovations (development of new products or services, processes, job methods etc.);
- ICT has a significant impact on key enabling technology development, such as nanotechnologies, micro and nano electronics, photonics, biotechnologies, advanced materials etc.

Moreover, it is stated that ICT economic impact can be asserted in three areas: creation and development of innovation, competitiveness and sustainability. All three areas of ICT impact are important in different levels (e-Business Watch, 2010):

- General economic level (macro level);
- Industrial level (mezzo level);
- Enterprise level (micro level).

Although ICT and implementation of ICT based practices became extremely popular during the last decade, in different phases of enterprise lifetime usually specific solutions of ICT usage are adopted. These solutions are related to organizational changes and knowledge of potential ICT impact on enterprise performance. In the private sector ICT implementation and ICT adoption could be affected by various environmental factors: politics, governmental decisions, competences and opportunities of collaboration, level of education and quality, culture of business, ICT infrastructure and other factors influencing a development of ICT based business.

Therefore Manocchhari, Al-Esmail, Ashrafi (2012) states that in order to benefit from ICT adoption, to deliver better services and explore new business opportunities, there should be satisfied at least three conditions. There should be a certain infrastructure and budget for investment in ICT and human resources with sufficient skills and knowledge of ICT. Ollo-Lopez and Aramendia-Muneta (2012) have highlighted a very similar groups of necessary conditions / factors for successful ICT adoption: factors related to the company personnel that is going to use ICT, factors related to the characteristics of the enterprise and factors related to the environment in which the company operates. If all conditions are satisfied positive impact of ICT could be expected in the private sector.

Although ICT contributes to companies by providing more visibility, more information, lessening traditional trade barriers in the market and facilitating financial operations (Manocchhari, Al-Esmail, Ashrafi, 2012), the impacts of ICT use on private sector are various and with diverse

aspects. ICT also influences flexibility of the enterprises – enterprises that adopt ICT tend to perform better in market and to differentiate products, services easier etc. Given the discussion above, it is expedient to focus attention on impact of ICT private sector and to discuss potential ICT impact areas.

3. ICT Impact Assessment Model

In scientific literature ICT impact assessment studies are a research object since 1990's. Traditionally greater attention has been given to private sector which tends to adapt ICT more expeditiously because of a greater competitiveness in the market (Ollo-Lopez, Aramendia-Muneta, 2012). In most cases, facing from enterprise perspective it might start from very simple ICT solutions such as email and within the time consider website development, ecommerce system adoption, networked organization development or possibility to join or to initiate digital business ecosystem. The impact of ICT use is various and with diverse aspects and therefore a few difficulties were encountered in scientific literature (UNCTAD, 2011):

- There are a number of different ICTs, with different impacts in different contexts and countries (e.g. goods, such as mobile phone handsets, and services, such as mobile telecommunications services, which change rapidly over time);
- Many ICTs are general-purpose technologies, which facilitate change and thereby have indirect impacts;
- It is difficult to determine what is meant by “impact”. A few studies highlights the diversity of impacts, in terms of intensity, directness, scope, stage, timeframe and characterization;
- It is difficult to determine causality (e.g. there may be a demonstrable relationship and a positive correlation between dependent and independent variables. However, such a relationship cannot readily be proven to be causal.);
- Usually, ICT impacts are very complex and includes more than economic, social or environmental aspects.

According to Balanskat, Blamire and Kefala (2006), impact could be understood as an overall achievement of the intervention on the system and can be described by a variety of qualitative indicators such as enhanced ICT skills or improvements in specific results. After a thorough situation analysis of advanced economies and some newly industrialized countries Hanna (2003) suggested a pervasive impact areas of ICT on:

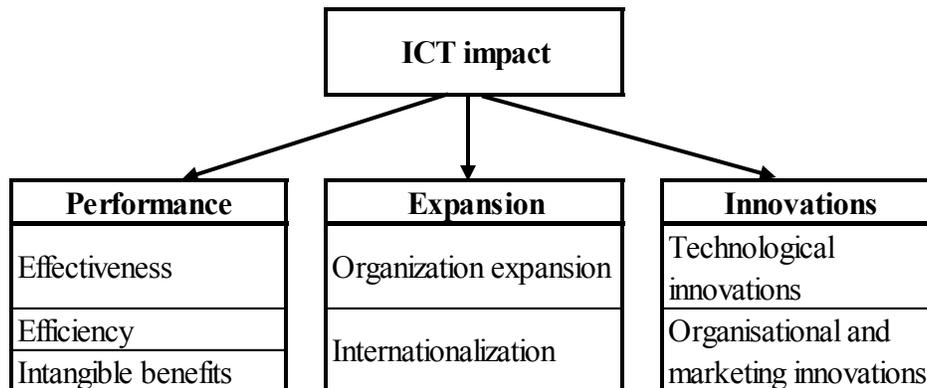
- Markets - ICT is transforming global and local markets;
- Organizations – organizations focuses on their core competencies while outsourcing increasing amounts of activities and services;
- Competitive strategies - ICT-induced changes are transforming the rules of competition and giving rise to new types of competitive strategies: innovation-driven competition, time-based competition, mass customization, lean manufacturing and demand-driven, and built-to-order products;
- Innovation - ICT is enabling the creation and evolution of innovation clusters, knowledge networks, and learning communities;
- Financial and other services – ICT allows establishing financial systems without first building a fully functioning financial infrastructure;
- Employment - ICT-induced changes in jobs and employment opportunities are leading to labor migration and global competition for knowledge workers, particularly in the ICT industries;

- Education - new competition, modes of operation, and forms of delivery are emerging in higher education and corporate training, including distance education, open online universities, mega and virtual universities, corporate universities and various forms of private sector participation and borderless educational services;
- Regional and spatial development - ICT revolution is likely to promote dispersal of services that can be delivered remotely and effectively;
- Poverty reduction - ICT can open up new opportunities for the poor and small enterprises. Studies show that investments in ICT had a considerable effect on the productivity of the labor force and on economic growth. (Manochehri, Al-Esmail & Ashrafi, 2012, Sabbagh, Friedrich, El-Darwiche, Singh & Ganediwalla, 2012) It is also known that ICTs make services more easily tradable and increase productivity in manufacturing enterprises. (Manochehri, Al-Esmail & Ashrafi, 2012) Also, Ollo-Lopez and Aramendia-Muneta (2012) complement these ideas by stating that ICT adoption seems to have a positive effect on productivity, directly as well as indirectly, depending on the sectors and to have great potential to support a sustainable development.

Moreover, Consoli (2012), Bayo-Moriones, Billon, Lera-Lopez (2013) emphasize importance of long term investments in ICT because the benefits, advantages or positive impact of ICT occur only after a period of adoption. It is important to take in mind that enterprises adopting ICT have to adjust their structure, make internal changes such as personnel training, and reorganize them. A number of studies have found that ICT has most impact when accompanied by complementary investments and changes, for example, in human capital, organizational change and other forms of innovation (OECD, 2004). Also, ICT had a greater impact on ICT service sector, tourism, financial services, publishing and logistics than small and medium enterprises in various sectors. In these areas ICT is used not only in order to improve effectiveness of business processes but also for an impact on value chain including opportunities for a new market participants.

Obviously, considering general implications of Hanna (2003) and the complexity of the object of ICT impact, the necessity to identify, understand and separate potential areas of ICT impact on private sector emerges. Therefore, after a review and analysis of scientific literature we propose integrated ICT impact model:

Figure 1. Integrated ICT impact model



Results of a literature review suggests that ICT impact on greater productivity and effectiveness, economic growth and organizational expansion is commonly identified in scientific literature. Also ICT has an impact on flexibility of enterprises and on innovativeness. Therefore we propose that there are a three main impact areas:

- Performance - considering ICT impact for efficiency, effectiveness, competitiveness and intangible benefits (Liang, You, Liu, 2010; Consoli, 2012; Santos, Brito, 2012; Bayo-Moriones, Billon, Lera-Lopez, 2013).
- Expansion - considering organizational growth and transformations, internationalization (Raymond, Bergeron, Blili, 2005; Matthews, 2007; Consoli, 2012).
- Innovations - considering ICT impact on new business models, new products and services, processes and organizational innovations (Markides, Anderson, 2006; Gago, Rubalcaba, 2007; Higon, 2011; Consoli, 2012; Hall, Lotti, Mairesse, 2013).

In the studies of ICT impact not only importance of IT knowledge, qualification and competencies is highlighted but also great attention is given to the long term investments to ICT. The important aspect of ICT impact is period during which the impact is observed. Many researches emphasizes that the positive impact of ICT occurs only after a period of adoption (Higon, 2013; Hanna, 2007).

To summarize, in scientific literature there are a lot of empirical studies (Andersen, Henriksen, Medaglia, Danziger, Sannarnes and Enemærke, 2010; Consoli, 2012) aiming to assess ICT impact in the context of private and public sectors. After a thorough analysis of theoretical complexion of ICT impact on private sector, the necessity of the complex assessment was identified. A theoretical assumptions determined a development of the ICT impact assessment framework. For instance, it was found out that ICT knowledge potentially has an impact on enterprise economic performance results and competitiveness (Santos, Brito, 2012; Consoli, 2012); higher investments to R&D and ICT impacts development of innovations (Hall, Lotti, Mairesse (2013). Moreover, positive ICT impact noticed in other areas: a typology of enterprises may impact ICT induced development of enterprise. Consequently, it was decided to perform a research on the ICT impact on competitiveness in the case of private sector in Lithuania.

4. The data collection and empirical findings

During the empirical research the aim was to identify the ICT impact on enterprise's performance, growth and innovations in the context of the private sector in Lithuania. Based on the analysis of the results of the research performed up to date, the following hypotheses were formulated:

- H1. Investment to ICT has an impact on the development of innovations in enterprises;
- H2. The level of ICT knowledge has impact on enterprise economic performance results and competitiveness.
- H3. Enterprise typology influence ICT based enterprise development.
- H4. ICT adoption in enterprise influence innovation development in the enterprise.

Quantitative research was chosen for the validation of hypothesis, and primary data were collected using a survey (research instrument – questionnaire) method, non-random convenience sampling. The survey questions were based on results of previous scientific research. The

reliability of the used instrument is assessed with the help of the Cronbach's alpha coefficient, which measures internal consistency of the questionnaire scale. The questionnaire is reliable (Cronbach's alpha coefficient is 0.986), and it can be used for a research.

During the research the questionnaires were distributed to enterprises that are operating in Lithuania. Research results are given, based on answers of 53 respondents. Therefore, due to very small sample size, this research is considered to be an exploratory research. The research data are analyzed with the help of the software SPSS 16.0 (Statistical Package for the Social Sciences). The correlation and regression analyses of the research constructs are performed for verification of the hypotheses. Dimensions of ICT impact are measured through sub dimensions and their specific indicators.

The study aims to attract representative number of enterprises from different stages however at current research stage a majority of enterprises that participated in the research were mainly from retail and wholesale trade (22.6%), manufacturing (16.98%), services maintenance (16.98%), construction (11.32%) and information and communication (11.32%) sectors. The results of these companies answers analysis is summarized below.

According to statistical data, investments in ICT had a slow growth tendency in Lithuania. Correlation analysis was used to assess **H1** (Investment to ICT has an impact on the development of innovations in enterprises). First of all, secondary data analysis revealed tendency that higher investments of private sector to research and development do not impact a development of innovations in the enterprises. Also, analysis of data proved that there are no direct relations and impact between investments to ICT and development of innovations, even though more than 80 per cent of enterprises, which participated in research, claimed that they are developing innovations.

During the verification of the hypothesis **H2** (The level of ICT knowledge has impact on enterprise economic performance results and competitiveness) ICT knowledge impact on performance and on competitiveness were analyzed separately. Results revealed that higher level of employees IT competences does impact more intensive usage of IT tools but latter does not have a direct or unambiguous impact on economic performance results. Moreover, analysis of data demonstrated that ICT also does not cause higher degree of competitiveness. The ICT knowledge varies between enterprises, but overall positive relation was observed (0,441, $p=0.052$).

Empirical data demonstrates that enterprise typology do not impact ICT based development as no statistically significant correlation (0,334; $p = 0.15$, whereas p should be <0.05) was observed between different types of industries (**H3**). Analysis of statistics demonstrated that big enterprises (more than 250 employees) performing in Lithuanian market (that has a greater financial resources) adapts IT systems more quickly during implementation of technological (process) innovations than small and medium sized enterprises. Also more intensive organizational expansion (new subdivisions or job placements, expansion to foreign markets) was identified between big enterprises. However, small and medium sized enterprises that participated in research tends to intensively implement organizational and marketing, as well as technological (process) innovations during the period of 2011-2014 but only a small part of them expands their performance by implementation of new job positions, subdivisions or entering new markets.

The ICT development is intensifying in many industries however there are no clear evidences that ICT adoption has an impact on enterprise innovativeness (**H4**). The general correlation is

very low, which might be explained due to the differences of ICT adoption and deployment in different industries. Nevertheless, enterprises with higher level of ICT adoption more intensively implement not technological (organizational and marketing) innovations such as new pricing methods, new methods of organizing external relations, and significant changes to product design. This tendency is characteristic to enterprises of retail and wholesale trade, administration and services sectors.

5. Conclusions and implications for future research

The ICT impact on enterprises is widely analyzed but typically from fragmented perspectives. The proposed integrated ICT impact assessment model evaluate 3 areas of ICT impact – performance, expansion and innovation. It is important to note, that the findings cannot be generalized due to the small sample size. The results are both provisional and preliminary and, therefore, require further investigation.

Analysis of empirical data demonstrate that ICT might play important role in innovativeness only in certain industries still many industries hardly become more competitive from ICT adoption. At this stage of research hypotheses were rejected but however a relation between investment to ICT and enterprise economic performance results was identified. Moreover these constructs are distinguished by a significant and strong impact. Moreover, this could mean, that there are some mediators involved and impact of ICT knowledge, investments, ICT adoption and typology is indirect.

Therefore, according to the results, suggestions for ICT adaptation in private sector is given:

- As a result of ICT implementation enterprises have an opportunity to expand their performance in organizational and country levels. In order to encourage enterprises for ICT enabled expansion, a constant investment to exploration of new markets and development of new job positions should be provided;
- Investment to ICT has an impact on enterprises economic performance result that directly influences all the areas of enterprise performance, therefore support for ICT development tools should be related to implementation of sophisticated solutions – that would enable creation and implementation of innovative decisions and services.

A current research could be expanded by analysis of other impact areas, such as sustainability. Also it would be constructive to analyze factors and barriers of successful ICT adoption and implementation that have an impact on competitiveness.

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