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**Conference Paper**

## Creative Industries In The Žilina Region – ICT Sector

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## CREATIVE INDUSTRIES IN THE ŽILINA REGION – ICT SECTOR

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### Abstract

Creativity is typically thought of in the singular – as an attribute. Creativity and imagination are the most important ingredients for coping with post-normal times. This paper looks at the way creativity itself is being transformed in ICT sector. Creativity researchers tend to refer to creativity as an attribute of a person. But it may be a set of multiple attributes. How those multiple attributes might be arrayed in ICT sector is, as yet, an open question. Paper also describes an importance of creative thinking and the place of ICT in creative industries. People might show consistent individual differences in processes, domains, and styles of creative thinking. To be effective in innovation efforts, ICT sector has to take into account the nature of the strategy and organizational processes of innovation as a mixture of creativity, irrationality and feasibility. Innovation is not similar to performing regular „business as usual“. Innovation is to a large extent unpredictable, complex, dynamic, non-routine-based, and involves creativity and risk. Innovation is difficult to control and is essentially an entrepreneurial process as such. People within a highly technical area have their ideas formed by technical possibilities, difference is important. Nevertheless, the idea can be used as a provocation, from which to move forward. Without some emphasis on 'difference' there is the danger that all new ideas will immediately drain back to the traditional ideas. It is important to keep all the above points in mind. Otherwise people in a highly technical area will not accept that the basic tools of creativity can indeed be applied in their area. ICT sector is a rapidly changing sector. If there are more than one forms of creativity, what forms might they take in ICT sector? This paper also answers questions on the subject of enhancing the creativity in ICT sector, environment supporting creativity in ICT sector, cognitive, personality and motivational constituents of creativity in ICT sector, relation of creativity to knowledge and expertise in ICT sector, role of technology and development enhancing creativity in ICT sector. This article has proposed some different ways, in which creativity in ICT sector might be multiple.

### Keywords

creative economy, creativity, ICT sector, Žilina Region

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## **1. Introduction**

Over the last decades Information and communication technologies have enabled changes in people's lives. ICT has been taken up in public services such as government, the health sector and educational and training (Osimo, 2008; Ala-Mutka, 2008; Punie, 2008; Redecker, 2008).

To be effective in innovation efforts, companies have to take into account the nature of the strategy and organizational processes of innovation. Innovation activities are a mixture of creativity, irrationality and feasibility. (Huizenga, 2007). Creativity is an integral part of innovation. This is the main reason, why the creativity in ICT sector is look over.

Mayer's (1999) review of seven definitions given by authors contributing to the 1999 'Handbook of Creativity' (Sternberg, 1999), provided the following definition of creativity: "[...]creation of new and useful products including ideas as well as concrete objects." A more recent, albeit unsystematic, review has confirmed the importance of this definition (Andreasen, 2005). Thus, in Zeng et al. (2011) "creativity is broadly defined as the goal-oriented individual/team cognitive process that results in a product (idea, solution, service, etc.) that, being judged as novel and appropriate, evokes people's intention to purchase, adopt, use, and appreciate it."

Authors trace the relationship between creativity, knowledge and innovations in this article. A number of studies have investigated creativity in many industries, but the sector of ICT is different and special for its rapidly changing development. In the sector of ICT, in comparison with other industries, it is much more important and even natural to be creative. In this article, authors analyze the place of ICT in creative industries and the current State of ICT Sector. For the purpose of this survey, there has to be ICT sector in Slovak Republic defined. Section 5 provides an analysis of ICT sector in Žilina Region. Authors has described the data, researched questions in Section 6 and also has reported principal results in Section 7. Discussion and conclusion follow.

## **2. The place of ICT in creative industries**

Creative industries have been developed when the world economy entered the era of knowledge economy. Creative industry is a product of the information age with the characteristics of high added value, low consumption of resources and knowledge density. It is a new composite-based industry of the integration of fashion industry, cultural industry, information technology and entertainment dissemination (Cao, 2011).

The term 'creative industries' was first formed by Tony Blair's 'New' Labour administration after they came to power in 1997. These industries posed a significant and growing part of UK economy. Creative Industries Mapping Document (CIMD) was released in 1998 and provided a definition of the creative industries sector: „*Those industries, which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property*“ (DCMS, 2001).

The creative industries have all the characteristics of high-tech industries. They demand a diverse mix of skills and are likely to gravitate towards urban areas that either have or are acquiring the institutions and other attributes to meet the labor requirements of the creative sector. They require a well developed ICT infrastructure to serve their clientele, and interaction with and IT manufacturing base to create and target their products. (Yusuf, Nabeshima, 2005)

The ICT sector is a heterogeneous collection of industry and service activities, Internet service providers (ISPs), libraries, commercial information providers, network-based information services and other specialized services (Mansell, Wehn, 1998).

Creative subsectors, such as electronic games, depend upon local and international networking in order to develop commercially successful products and to enhance their market prospects. The forward linkage is assessed to be significant if the source industry accounts for at least double the economy average – 0,7 percent of the purchasing industry's total goods and services inputs. The linkage is considered strong, if this dependence is at least 3 percent. (Yusuf, Nabeshima, 2005)

### **3. The Current State of ICT sector**

As mentioned above, creativity is an integral part of innovation. Innovation is a risky adventure involving a great deal of unforeseeable uncertainties. Innovation is based on a promising idea that is partially associated with luck and chance as to whether the outcome will be accepted by customers. (Huizenga, 2007).

The performance of Denmark, Finland, Germany and Sweden is well above that of the EU27 average. These countries are the 'Innovation leaders'. Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27 average. These countries are the 'Innovation followers'. The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27 average. These countries are

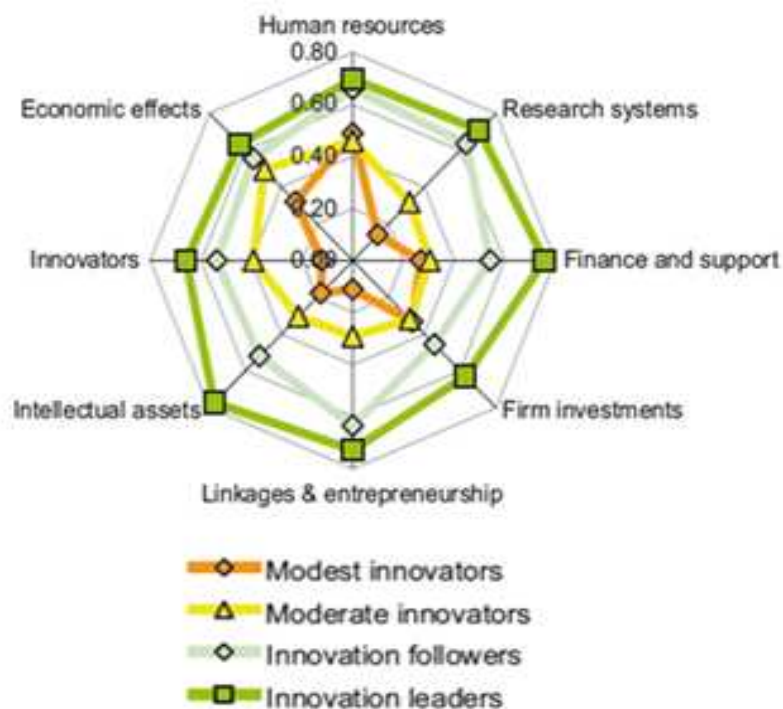
‘Moderate innovators’. The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27 average. These countries are ‘Modest innovators’. (See Figure 1)

Innovation Leaders	Innovation Followers	Moderate Innovators	Modest Innovators
Sweden, Denmark, Germany, Finland.	Belgium, Cypress Estonia, France, Netherlands, Ireland, Luxembourg, Austria, Slovenia, United Kingdom	Czech Republic, Greece, Hungary, Malta, Poland, Portugal, Slovakia, Spain, Italy	Bulgaria, Lithuania, Latvia, Romania

Source: [http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011\\_en.pdf](http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf)

**Figure 1** Country Groups: EU Member states Innovation Performance

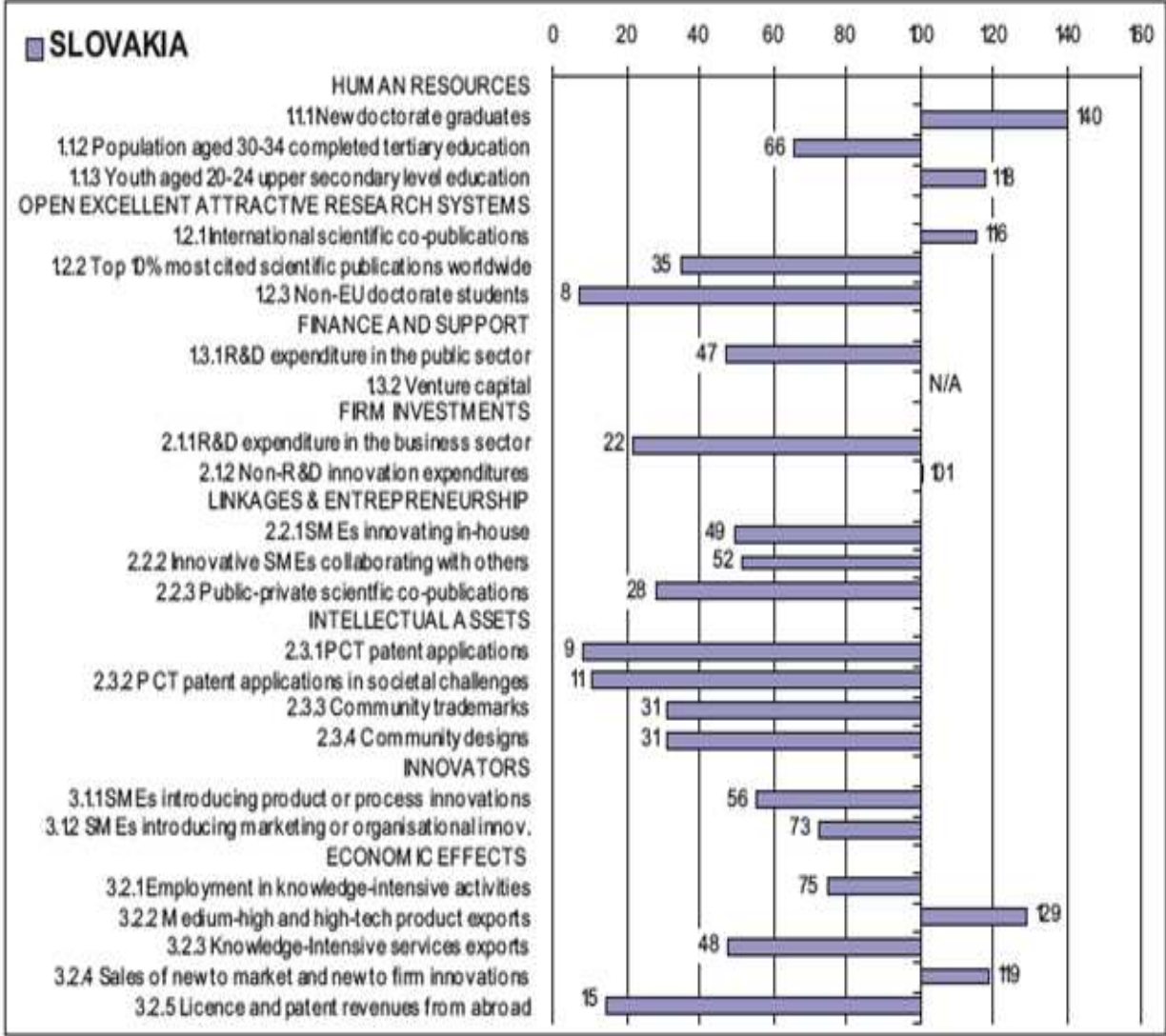
While there is not one single way to reach top innovation performance, it is clear that all innovation leaders, Finland, Sweden, Denmark and Germany, perform very well in Business R&D expenditures.



Source: [http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011\\_en.pdf](http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf)

**Figure 2** Country Groups: Innovation Performance per Dimension

Most of the innovation leaders also perform very well in other innovation indicators related to firm activities. The top EU innovator Sweden dominates in three out of 8 innovation dimensions: Human resources, Finance and support, and Firm investments; while Germany and Denmark perform best in two innovation dimensions each. (See Figure 2)



Note: Indicator values relative to the EU27 (EU27=100)  
 Source: [http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011\\_en.pdf](http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf)

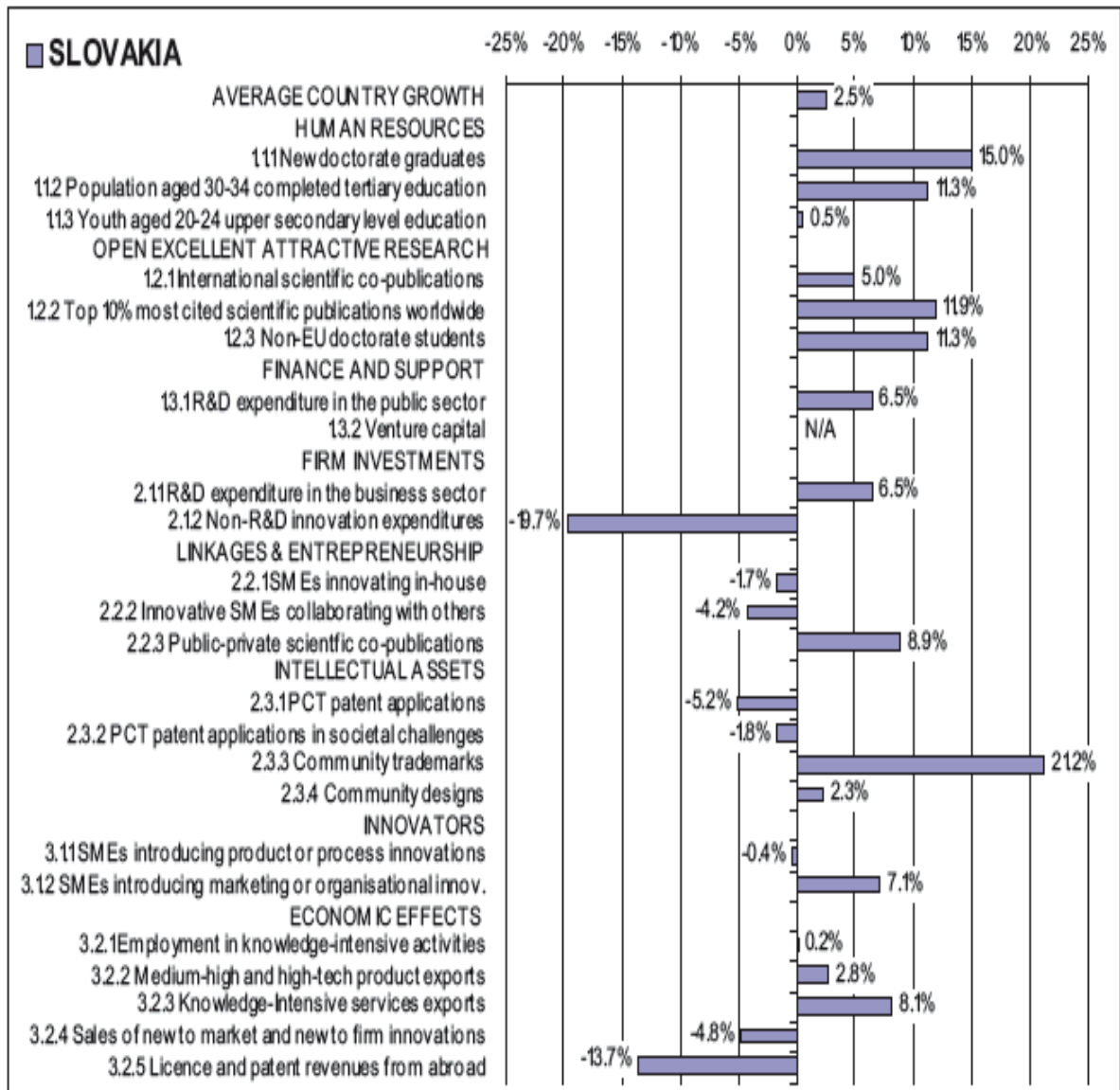
**Figure 3** Annual average growth per indicator and average country growth

Slovak Republic (Slovakia) is one of the moderate innovators with a below average performance. Relative strengths are in Human resources and Economic effects. (See Figure 3)

Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Firm investments, Linkages & entrepreneurship, Intellectual assets and innovators. High growth is observed for New doctorate graduates and Community trademarks. A strong decline is observed for Non-R&D innovation expenditure and License and patent revenues from abroad. Growth performance in Human resources, Open, excellent



and attractive research systems and intellectual assets is well above average. (European union, 2012) (See Figure 4)



Source: [http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011\\_en.pdf](http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf)

**Figure 4** Annual average growth per indicator and average country growth

As can be seen in Table 1, In score of Global Creativity Index (GCI) for 2011, Slovakia placed the 41st place. The best score in this indicator has got Sweden. Finland is the best in Talent and Technology. Finns worsened indicator Tolerance towards ethnic and racial minorities and against homosexual people. The most tolerant nation in this study is Canada.

Quah (2002), emphasizing demand over supply, argues that the Information and Communication Technology (ICT) revolution is fostering improvement in labor skills, consumer sophistication, and an increased level of broad-based education. This encourages

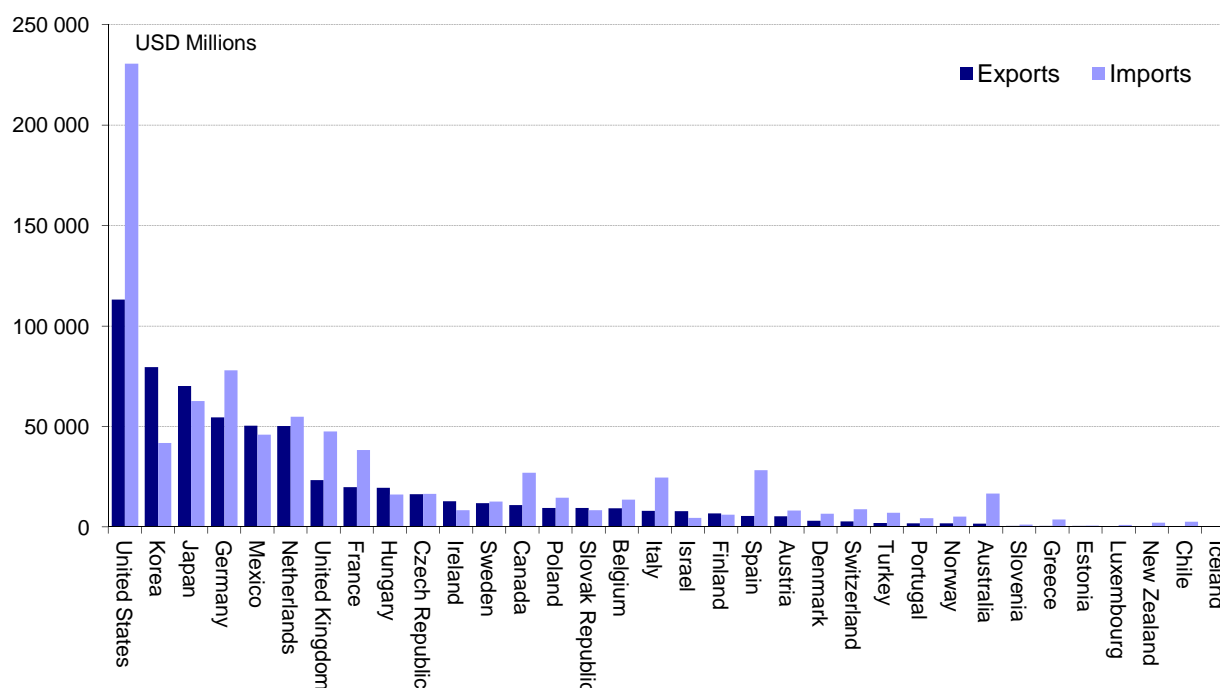
the improved use of technology and raises labor productivity and as a result, “drives economic growth, one way or another” (Quah, 2002, p. 22). Levine (1997) argues that relaxing barriers to information access that ICT is believed to be an important driver, promotes faster growth by encouraging increased investment. The link between investment in information technology and growth has been investigated by a wealth of studies. (Kguong, 2011).

**Table 1** The Global Creativity Index

Total rank	Country	Technology	Talent	Tolerance
1.	Sweden	5	2	7
2.	United States	3	8	8
3.	Finland	1	1	19
21.	Austria	13	30	35
26.	Hungary	33	25	34
29.	Czech Republic	25	31	49
41.	Slovak Republic	36	33	55
41.	Poland	37	29	58
49.	Ukraine	34	27	77

Source: R.FLORIDA – CH.MELLANDER – K.STOLARIEK: Creativity and Prosperity: The Global Creativity Index, Martin Prosperity Institute, September 2011. [online]. [cit.2012-01-20]. Available online: <http://martinprosperity.org/media/GCI-Report-reduced-Oct%202011.pdf>

According to OECD reports, United States engaged in exports of ICT goods the sum of 113, 157 mil.USD and import with sum of 230,627 mil USD.



Source: Trade in ICT goods 2009, Available at: [http://www.oecd.org/document/23/0,3746,en\\_2649\\_34223\\_33987543\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/23/0,3746,en_2649_34223_33987543_1_1_1_1,00.html)

**Figure 5** Trade in ICT goods 2009



Japan - export 70.164 mil. USD, import 62.726 mil. USD. Hungary is the best among the neighboring states of the Slovak Republic (Export 19.517 mil. USD, import 16.199 mil. USD), followed by Czech Republic (export 16.305 mil. USD, import 16.456 mil. USD) and last but not least Poland (export 9.510 mil. USD, import 14.609 mil. USD).

Only the Slovak Republic (export 9,410 mil. USD, import 8,429 mil. USD), together with Japan, Hungary, Korea, Mexico, Ireland and Israel have higher export than import. Poland with Austria are the last two countries neighboring of Slovakia in this rank. Poland (export 9,510 mil. USD, import 14,609 mil. USD) and Austria (export 5,271 mil. USD, import 8,141 mil. USD). There are no data about Ukraine in this study. (See Figure 5)

In 2011, the top ten largest ICT companies in Slovakia employ more than 1/3 of employees. As many as 5,095 companies employ less than 10 people. Average monthly salary in the ICT sector exceeds 1,500 EURO. Non-financial business sector (industry and services) makes approximately 78.5 per cent of the added value in economy in cost prices in the economy while the ICT sector share was 8.62 per cent. The approved state investment aid for ICT sector reached 29.5 million EURO in 2002-2010 that represents 2.6 per cent of the total volume. The approved state investment aid for the automotive industry reached 661.8 million EURO that makes 59 per cent of the total aid provided. (Slovak IT Association, 2011)

#### **4. Methodological definition of the ICT sector in the Slovak Republic**

In order to consider the role and signification of Information and communication sector (farther ICT sector) we have to go out from the available methodic that defines this sector, used for the demands of economical statistic. Unitary Eurostat NACE rev 1.1 methodology was replaced by NACE methodical rev. 2 in year 2008. There had been used OKEČ methodology, which met classifications NACE rev. 1.1. ( in modified version accommodated to domestic conditions) till 2007 in Slovakia. While the IT services were acknowledge as a part of services sector (category K, real estates, rent and trade services) by OKEČ methodic, methodic NACE rev. 2 acknowledge IT as an independent sector. This significant methodic change presents major problem by comparing of former economic development sector. (See Figure 6)

The only exception is presented by divison of telecommunications, which ooccurs in both methodics in a separate form.

Both forms were used by statistic agency to check infomations only in the year 2008 due needs of short term predictions. National invoice, a savoir GDP or brutto added value, that are key factors to determine single sectors of economy, are still allocated in OKEČ

methodic. This fact does evocate problem by a accurate quantification of ICT sector in a way defined by NACE rev.2. ( Slovak IT Association, 2011)

Statistic definition of ICT sector through NACE and OKEČ includes merely companies, which allocate activities related to ICT as a main activity. Statistical reporting is made according to companies location, in separate regions, what makes the situation in some cases significant misleading. Several big companies are located in Žilina region (Sec. 4), but many of them are not statistical reported, due a fact of their headquarter location in other cities.

These days ICT specialists works in every kind of enterprise unit, presenting a group of very creative employees creating SW solutions for specific situation. The sector of ICT is a common platform for all sectors (education, medicine, public administration etc.)

<p><b>The ICT Sector</b> Statistical Office of the Slovak Republic SK NACE rev. 2</p>	<ul style="list-style-type: none"> <li>• Publishing activities,</li> <li>• Film, video, TV production,</li> <li>• Broadcasting,</li> <li>• Telecommunications,</li> <li>• Computer programming,</li> <li>• Information services</li> </ul>
<p><b>Primary ICT Sector</b> Statistical Office of the Slovak Republic Slovak IT Asociacion</p>	<ul style="list-style-type: none"> <li>• Telecommunications,</li> <li>• Computer programming,</li> <li>• Information services.</li> </ul>
<p><b>Creative ICT Sector</b></p>	<ul style="list-style-type: none"> <li>• Computer programming</li> </ul>

**Figure 6** Methodological Definition of ICT Sector

Publishing includes purchase of copyrights regarding content (information products) and activities related to intervention of above mentioned content for general public regardless concept and reproduction and distribution of this content. This section includes all forms of publishing (print, electronic or audio form, net, CD etc). Activities related with production and distribution of TV programs belong to part 59, 60 and 61 and distinguish different phase in this process. Production of independent programs, films, series, etc include division 59, whereas production of complete TV programs for TV channels include division 60.

Division 60 includes also broadcast of programs from the very producer of such programs. Distribution of complete TV program through third sides i.e., without further changes of content included division 61. This distribution can be carry out through satellite

and cable systems. Classification of sector IKT v NACE rev. 2 is much extensive (addition 1.3). By reason of illustration of service condition regarding communication and information technologies, mentions should be given. Main IKT sector include those three divisions:

61-telecommunications

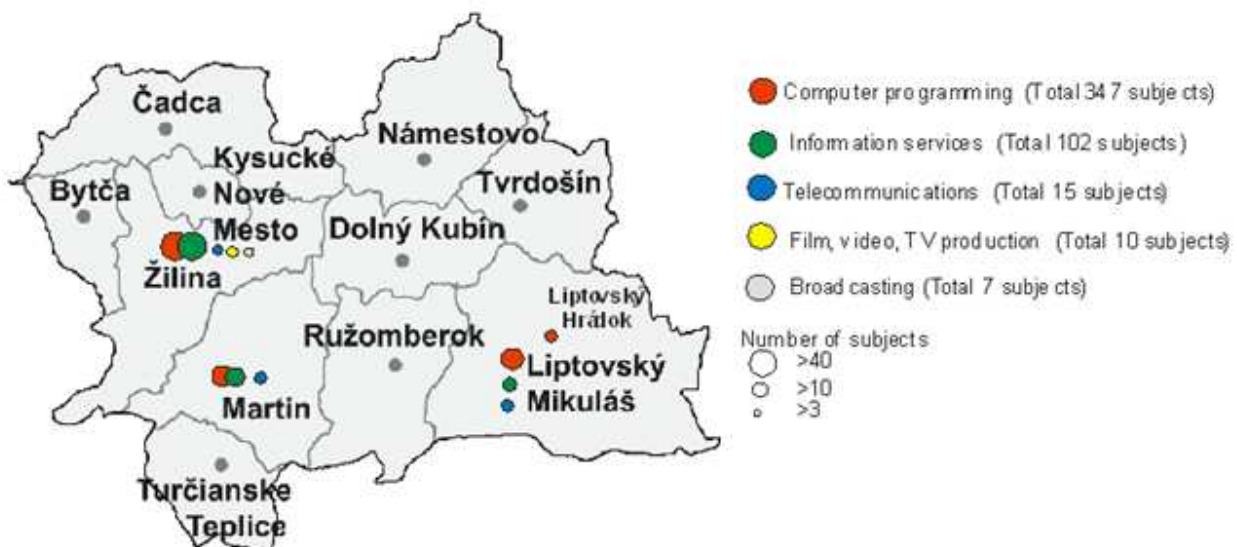
62- PC programming

63-information services

OECD defines sector of ICT as a complex of all subjects, which generate products, permitting electronic imaging, handling, saving and transmission of data. This sector includes companies, which generate devices, software and hardware services, external devices, pc software, telecommunication services. Information and communication technologies presents integrated complex of information and communication technologies used not only for preparation and elaborating of information but for managing of information and processes as well. Hereby more effective results can be achieved through optimization of source management and redistribution of information and know-how.

## 5. Creativity in sector of ICT in Žilina Region

The development of the ICT sector in Žilina Region occurred mainly after 1990, when computer art was already at a higher level. Czechoslovakia was connected to the global internet network in 1992. Especially because of internet, but also thanks to the rapid development of hardware and software, this year could be identified as a milestone in the development of new companies. From the primary ICT sector there are most active players operating in the field of computer programming, which is the sole regarded as a creative one. (See Figure 7)



**Figure 7** ICT Subjects operating in Žilina self-governing region

An overview of the most creative companies operating in Žilina Region in the field of computer programming is together with a summary of their revenues and scope of business activities shown in the table 2.

**Table 2.** Creative ICT companies in Žilina Region

Company	Sales							Main business activity
	million SKK						million €	
	2003	2004	2005	2006	2007	2008	2009	
Alcatel Slovakia, Inc., Liptovský Hrádok	1 304.105	1 604.528	-	-	-	-	-	Computer hardware sale
Euro Media, sole trader, Žilina	824.274	1 064.761	1 967.195	2 646.309	2 269	-	-	Distribution of computer hardware
K+K, Inc., Žilina	604.693	710.140	826.734	813.738	814.479	-	-	Computer hardware sale, services
DigiTel HS Slovakia, Ltd., Žilina	103	241.189	285.119	-	-	-	-	
DIGICOM, Ltd., Žilina	264.104	410.530	452.991	-	-	-	-	Distribution and sale of computer hardware
VARIAS, Inc., Žilina	175.490	162.604	171.549	261.394	-	-	-	Services
GiTy - Slovensko, Inc., Martin	153.652	127.333	-	112.305	102.462	-	2.678	Services
IPESOFT, Ltd., Žilina	57.383	90.984	106.685	242.395	137.613	218.442	4.518	Services, computer software sale
KROS, Inc., Žilina	53.413	84.123	99.732	123.454	160.985	218.983	5.715	Computer software sale
HOUR, Ltd., Žilina	55.321	58.728	64.003	73.697	62.426	-	2.205	Services, computer software sale
Softip Server, Inc., Žilina	71.779	58.545	-	-	-	-	-	Services, computer software sale
PROSOFT, Ltd., Žilina	-	-	-	82.636	74.478	-	-	Computer hardware sale, services
SUNSOFT plus, Ltd., Dolný Kubín	-	-	-	24.443	-	-	-	Computer hardware and software sale
ORIWIN, Ltd., Žilina	-	-	-	-	-	-	1.803	Services

Note: SKK - Slovak Koruna, 1 SKK = 0.0331937005 €

Source: Čorejová T. a kol. : Znalostná infraštruktúra a trajektórie znalostí v regionálnom kontexte [elektronický zdroj] / Tatiana Čorejová a kol. ; vedecký redaktor: Dušan Kevický. - 1. vyd. - Žilina : Žilinská univerzita, 2011. - 1 elektronický optický disk (CD-ROM), 438 s., [AH 26,29; VH 27,03]. - ISBN 978-80-554-0411-0.

Žilina self-governing region annually declares award named ‘Innovation of Žilina Region’ to support innovation activities of innovation leaders in the region and stimulate companies to work on innovative solutions and processes. Realization of this award results from the project Žilina Innovation Policy. The aim of the policy is to support innovative activities in the sector of small and medium enterprises as well as to support subjects essential for regional development.

From the companies of ICT sector the award was in 2011 declared to the company Ipesoft, Ltd. within the conference Innovative Development of Regions in the category of Small and Medium Enterprises. IPESOFT was successful also in 2010, they received award IT Project of the Year in the Slovak Republic.

Following two aspects: total amount of revenues and number of employees, we can see the most important enterprises from the ICT sector in Žilina Region in table 3 and table 4.

**Table 3.** Overview of the ICT companies in Žilina Region according to the amount of revenues, 2011

<b>Company</b>	<b>Revenues (thousand €)</b>
PROSOFT, Ltd.	1000 – 1999.999
Scheidt & Bachmann Slovensko, Ltd.	6000 – 14999.999
MIM, Ltd.	
ELEKTROSYSTEM, Inc.	2000 – 2999.999
HOUR, Ltd.	1000 – 1999.999
DOXXBET.SK, Ltd.	
ORIWIN, Ltd.	

Source: Statistical Office of the Slovak Republic

**Table 4.** Overview of the ICT companies in Žilina Region according to the number of employees, 2011

<b>Company</b>	<b>Number of employees</b>
Scheidt & Bachmann Slovensko, s.r.o.	200-249
PROSOFT, spol. s r.o.	20-24
HOUR, spol. s r.o.	25-49
DOXXBET.SK, s. r. o.	
MIM, s.r.o.	10-19
INSEKO A.S.	
ELEKTROSYSTEM, a.s.	
KODAS Žilina, s.r.o.	
SKEAGIS, s.r.o.	
ORIWIN, s.r.o.	

Source: Statistical Office of the Slovak Republic

Location quotient has been calculated for all  $i$  to determine whether or not the local economy has a greater share of an ICT industry than expected.

$$LQ_i = \frac{e_i/e}{E_i/E} \quad [1]$$

Where:

$LQ_i$	Location quotient in industry $i$ ,
$e_i$	Regional Employment in Industry $I$ in Year $T$ ,
$e$	National Employment in Industry $I$ in Year $T$ ,
$E_i$	Total regional Employment in Year $T$ ,
$E$	Total National Employment in Year $T$ ,

By means of the above formula there was a proportion of ICT sector in local (regional) employment compared to a proportion of ICT sector in national employment rate. To calculate the location quotient there were necessary data from the Statistical Office of the Slovak Republic:

$$LQ_i = \frac{771/129989}{31797/1286326} = 0,238 \doteq 0,24$$

Note: Data for calculation were acquired from the Statistical Office of the Slovak Republic (Source: Statistical Office of the Slovak Republic. [online]. [2012-04-7]. Available at: <[http://portal.statistics.sk/files/zamestnanci\\_a\\_priemerne\\_mesacne\\_mzdy\\_2011.pdf](http://portal.statistics.sk/files/zamestnanci_a_priemerne_mesacne_mzdy_2011.pdf)>)

According to the calculated value which is 0,24; we can conclude that  $LQ_i < 1$  is valid, i.e. the ICT industry in Žilina Region employs less people than it is on the national level.

## 6. The Research and Research Questions

Primary research was conducted from September 2011 to April 2012 with the main aim to answer research questions. The formulation of research questions followed on secondary research – the study of literature and analysis of the current status of ICT sector in Žilina Region. Research questions are as follows:

RQ1: *Who is the creator of creative ideas?*

RQ2: *How can the environment be designed to support creativity in ICT sector?*

RQ4: *What is the relation of creativity to knowledge and expertise in ICT sector?*

Whereas primary research was set to be interview, ten leading companies of the ICT sector in Žilina Region were asked to participate. With a starting point of elaborating partially standardized questionnaire, there were suitable respondents selected. Respondents were employees of selected companies operating in ICT sector, division 62 – Computer Programming according to the SK NACE rev. 2 classification. This division is considered to belong to creative sector. The survey focused on three main areas: Innovation, Finance, Creativity and Impact of external environment. Seeing that respondents disapproved to be



named and asked for anonymity of their company's name, answers are evaluated as anonymous. Since it is impossible to cite all respondents with their answers, all responses were processed and there was a summary of all answers created.

71 % of respondents pointed that companies they work for do not have a separate creative department, so 29 % of respondents work for a company which built a separate creative department. The level of innovation activities and creativity in companies depends on customer requirements. Customer is the main impulse for making decision to create innovate products and services. In second place it is a competition, rapid development of new technologies in ICT sector and up-to-date trends in this branch, but also new functionality of applications and impulse coming from the company's management. Employees are seen as innovators with creative ideas. They acquire new ideas for creative solutions through participating in workshops, monitoring trends in the ICT sector, monitoring their competitors, market situation and running projects. In general companies in the ICT sector of Žilina Region does not cooperate within the implementation of new products or services.

Regarding factors affecting the region's ICT industry, respondents suppose that this industry is mostly influenced by dynamics of technology development and progress of IT technologies and applications. Another factor of the sector's development is the trend of overall economic development of the country but also competition, demand or new trends in marketing.

According to customers the government of Slovakia does not support ICT sector sufficiently. Some respondents think that the government is more focused on other sectors, mainly on automotive industry.

In respect of negative factors affecting employees while developing creative ideas, the main factor was found to be stressful working environment. Other negative factors affecting the employees in creating ideas include:

- Too rigid environment (stark working environment),
- Deadlines,
- Constant supervision by management and managers,
- Pressure from the side of the employer,
- Rush at workplace,
- Bad relationships with other employees,
- Unkind working atmosphere,
- Negative thinking,

- Misunderstanding and criticism from management,
- Creative ideas generate only in a home company, while there are employees in a Slovak affiliated branch only working with them and do not even have to think creative.

Regarding question about education, all respondents answered equally, and that all employees should be educated in the field of company's business activities. When introducing new products/services it is not necessary to neither carry out special training nor hire new experts because all employees involved in new innovative solutions are experts in their field. On the other hand, we can state that these employees continually have to learn new things. All companies that participated in the survey have close relations and cooperate with the University of Žilina.

Respondents were asked to identify strengths/weaknesses and opportunities/threats of the ICT sector. These can be seen in figure 8.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Plenty of university graduates and experienced IT professionals in the region who are lower remunerated than graduates and experts abroad,</li> <li>• Existence of innovativeness in the industry and talents in companies,</li> <li>• Constant development of the industry and new technologies,</li> <li>• Information literacy of users,</li> <li>• Good availability of internet in the region.</li> </ul>	<ul style="list-style-type: none"> <li>• People have low awareness of ICT products and their use,</li> <li>• Strong competitors on the industry,</li> <li>• Weak competitiveness in developing new technologies.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Possibilities of education in 'perspective' fields (Java, C++, MS Visual Studio),</li> <li>• Development of unknown technologies,</li> <li>• Increasing awareness of people about the field of ICT,</li> <li>• Employing of young people who can bring new ideas,</li> <li>• Investments,</li> <li>• New trends in ICT.</li> </ul>	<ul style="list-style-type: none"> <li>• People are too dependent on technologies that reduces their ability to solve problems independently,</li> <li>• Entry of new competitors into the industry,</li> <li>• Threat of losing know-how and competitive advantage.</li> </ul>

**Figure 8** SWOT analysis of ICT sector in Žilina Region

## 7. Results

From the basic analyses and research regarding information-communication technologies in Žilina region following can be stated: although this branch doesn't belong among the regional dominancy, it still cannot be considered gutless. In term of human resources, this sector offers lavish sources of experienced experts, skilled in technical and technological procedures. These experts must face to various demands from customers and company management. Seeing a fact, that creativity is hardly to measure, we can only guess the level of creativity in companies placed in Žilina region. The Majority of companies are running in a non innovative and non creative mode, but they are still classified as "creative companies".

Likewise, statistics and branch classifications include employees of above mentioned companies performing without any sense for creativity. Employees such gate keepers, cleaners, clerks etc., are employed in a creative company and are included into employee figures but these do not perform this kind of creative work. Due this fact it is complicated to state the correct figure of employees involved. A recent survey exposed following conclusions related to survey questions.

RQ1: *Who is the creator of creative ideas ?*

The main motion regarding decision by innovation of products and services – to be creative comes from the side of customers - demand. The Second source of the main motion are competition and effort to be competitive, sustain tempo in steadily changing conditions, followed by employees and last but not least the management of the firm.

RQ2: *How can the environment be designed to support creativity in ICT sector ?*

The major factor influencing IKT sector is a rapid development of technologies and applications, not less important factor of macro environment is an economic process. In term of macro-environment it is also a rapid changing competition, demand and market inquiry. Unthinkable part of IKT sector support should be guaranteed by the state. The most significant factors influencing working conditions are stress, misunderstanding and critique from the side of company management.

RQ4: *What is the relation of creativity to knowledge and expertise in ICT sector ?*

Education as well as high level of knowledge present an unthinkable part of every employee operating in IKT sector, whose the main role is to think creative and create a creative product. It is possible to get a creative idea without knowledge , however the knowledge is important for the realization of the creative idea. The very process of realization

presents the major task of employees operating in sphere considered be creative within the frame of IKT sector (See Figure 9)

Žilina is a large city, which offers a wide scale of self realization opportunities. Moreover, Žilina can be considered “wealthy city“ concerning human resources, whereas University of Žilina becomes the major source producing alumni in a field of technique and technology.

<b>Attributes of Creativity</b> (Mayer's 1999, Sternberg, 1999, Andreasen, 2009, Piffer 2011)	<b>Attributes of Creative Product in ICT Sector</b>
Novelty, Imagination, Appropriateness/Usefulness Differentiation from standard, Applied into practice Economic Efficiency Intellectual property	Novelty, Appropriateness/Usefulness, Effectiveness/Functionality, Economic Efficiency, Intellectual property. <b>High level of knowledge,</b> <b>Value added</b>

**Figure 9** Attributes of creativity vs. Attribute of Creative product in ICT Sector

Figure 8 compares definitions of creativity (Mayer's 1999, Sternberg, 1999, Andreasen, 2009, Piffer 2011) with attributes of creative product in sector of ICT. If the creative product will meet all attributes within the range of creativity and attributes, determined from the results of research, this product can be defined as a creative product.

## 8. Discussion

Creativity is in a peak season. This term in nowadays used to define internally diverse group of economically active people engaged in inventiveness and new ideas. Core parts of creative industry are architecture, design, film, media, software, fashion design, music and art. For creative industry there is a group of enterprising people essential; these people primarily use creative ideas, talent and new ideas at their work.

According to The Economist Intelligence Unit study (eTrend, 2012) Slovak local firms are not an important source of product innovations, while they do not possess necessary structure, processes and global thinking as well. This tends to be the biggest source of possible reserves of restructuring of the Slovak economy. Education, governmental support of infrastructure development and labour market policy are linked to the support of innovative companies.

Actual mapping of creativity in ICT sector distorts disunited definition of the sector which is a starting point for making statistics. This inconsistency in the definition of ICT sector significantly distorts in the positive or negative way realized secondary research. Given

the above, table 3 should be considered as illustrative one, because it does not reflect mergers that took place in a given period. For example, VARIAS, Inc. became part of S & T Bratislava in 2007, but did not leave Žilina and its programming services are still offered. Accordingly, Siemens, Ltd. which focuses on programming (for rail transport) operates in Žilina, but it is not reported in statistics due to fact, that its headquarters reside in Bratislava. Former VARIAS, Inc. and Siemens, Ltd. employ in Žilina about 80-100 programmers. Thus we may regard the value of the location quotient influenced.

The initiative to creative activities has to originate from creative people, but also should be supported by the government. The role of government and regional institutions is to create appropriate conditions that would lead to creation and development of creative ideas. It is necessary to ensure that the education system encourages young people to develop their creative skills and talent. It is also necessary to ensure that creative start-ups have access to financing for their investments. We can not forget about the sensitive area of intellectual values which creative sector generates.

As the primary research was not conducted in all companies in the Žilina Region, but only on a selected sample, results of the research may be considered as a screening analysis of the current status of the ICT sector in the field of computer programming. The realized research was the first of the planned surveys. Authors plan to carry out the survey on a wider sample of respondents in the future, not only in the Žilina Region but in the whole Slovakia because of making comparison of nationwide state of ICT sector especially in the field of computer programming which is considered to be creative.

## **9. Conclusion**

Day by day, information and communication technologies has become an inventible part of modern life. Advanced programs and applications promise promptitude, novelty and docility. Technical advance aims forward with a sky-high velocity and employees that produce programs and applications don't keep up emit new ideas and creative solutions.

This article exposes issue of creativity in information and communication technologies. In a pure theoretical way article specifies attributes of creative product in IKT sector.

Occasionally terms creativity and innovation are falsely commuted, but in fact these terms cannot be considered not even as synonym due their different meaning. To be creative means own an idea that is original, new, forming and creating something. In a field of innovation we call entitle such idea as invention. True meaning of invention can be

characterized by spending money to achieve generation of ideas. Innovation is a process, by which money are generated from the very ideas.

Thomas Edison was an innovator, earned a huge profit from his ideas. On the other hand Nikola Tesla was a contriver, he used all his money and minds to achieve inventions, but he never gained financial profit. Contriver creates creative ideas. Innovator make this ideas applicable. (Improvements, 2010)

Both, contriver and innovator are needed to be under one roof to achieve highly qualitative products considering inquiry with 100% level of knowledge, acquirement, benefit and added value.

The new symbiotic and integral (holistic) approach assumes that without an appropriate use of ICT for development funds will not be used efficiently and vital sectors such as an education and health will not be able to adequately provide their benefits. A fundamental shift is required in a view of the marginalized regions, countries and population groups in terms of global economy.

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