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COMPARISON OF COMPUTERISATION AND INNOVATION ACTIVITY OF THE COMPANIES IN RURAL AND URBAN AREAS

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Over the last years, the economic and social structure of enterprises has undergone some important changes, especially because of the introduction of Information and Communication Technologies (ICTs). ICT is one of the fundamental elements driving the innovation and competitiveness of business activities which greatly influences the development of rural areas, both in economic and social terms. This publication focuses on the analysis and evaluation of the use of ICTs by enterprises in the Lubelskie Voivodeship with particular emphasis on rural areas. In the publication the authors use statistical analyses based on information from surveys conducted among entrepreneurs by the Marshal Office of the Lubelskie Voivodeship. The paper evaluates the following issues: the degree of computerisation of the company, the use of information technology in the company, the activity of the company on the Internet. The main objective of this study is to identify the relationship between the degree of computerisation and the company's innovation-oriented activities and to identify differences between companies located in urban and rural areas. The studies carried out have demonstrated that the differences in the computerisation of enterprises located in rural and urban areas are negligible and that there is a close relationship between the degree of computerisation and innovation in enterprises located in rural areas.

Keywords: enterprises, information and communication technology, innovation, internet, rural and urban areas.

INTRODUCTION

The term information technology (ICT), also known as information and telecommunications or data communications, is understood as technologies for the electronic and digital processing, gathering and transmitting of information, mostly via computer networks, mainly the Internet (Macik, 2013). These include in particular computer technology (hardware and software) and communication technologies. Information technology is also the area of knowledge which includes: information science, telecommunications and other technologies connected with information. They provide the tools that can be used to obtain information, select it, analyse, process and transmit to recipients (Matusiak, 2011).

ICT takes on the main role in the economy transformation process as well as in the creation of a vital source of competitiveness for enterprises (Pena et al., 2011). ICT has a positive effect on the productivity and flexibility of companies, to adapt to contingencies of the market, enabling the tailoring of their packages to the needs of the market. This has become especially relevant in the recent years, as due to globalisation companies are facing significant challenges originating from an increase in competitiveness on the markets, the appearance of new products and the higher expectations of consumers (Chen et al., 2013; Ollo-Lopez, 2012; Tarute et al., 2014).

Information and Communication Technologies (ICTs) are an important factor conditioning development in the modern world, supporting the flow of data, services and people. Economic growth is based on technology, innovation and, more broadly, knowledge. In addition, Information and Communication Technologies (ICTs) are key tools in promoting innovation-oriented activities, technology diffusion, and knowledge generation within societies (Kijek et al., 2010). Indeed, as Information Society paradigm matures, the effective use of ICTs becomes an indispensable measure in promoting sustainable growth (Avgerou, 2010; Balboni et al., 2011; Jarosz-Angowska et al., 2014).

The role of ICTs in rural areas is substantial and it is steadily growing. No change in the functioning and improvement in the social and economic situation of individual areas is possible without the use of the infrastructure of the 21st century – the Internet. The Internet facilitates access to endless data resources deposited over the world (regardless of their spatial location), and it also streamlines communication. The Internet stands as one of the important factors expediting the socio-economic development of rural areas. It makes it possible to gain knowledge, improve education or

even legitimately earn a certain level of education, while eliminating the inconveniences associated with the remoteness of rural areas (Czapiewski et al., 2012; Sawicka, 2010; Tripathi, et al., 2012).

The impact of the Internet on businesses and on consumers is significant regardless of the location and type of enterprise, and while this is observable throughout social and economic life, especially in respect of businesses many theories and speculations have emerged. When it comes to small enterprises, democracy facilitated by the Internet has been theorised as affording greater competitiveness by providing a more level playing field in terms of visibility, profile and market opportunities previously characteristic of large companies with sufficient resources for these. For rural entities particularly, the Internet is further theorised as having the capacity to reduce the disadvantages inherent in rural locations, such as isolation from markets, relatively weaker networking and support provision, and indeed, the increasing profile of and competition from external web-based providers (Galloway et al., 2011; Nayak et al., 2010).

In accordance with the Millennium Development Goals (MDGs), the 2003 phase of the World Summit on the Information Society (WSIS) held in Geneva agreed on a Declaration of Principles and a Plan of Action, setting ten targets and several action lines to be achieved by 2015. The targets put forward under the Plan of Action aim, *inter alia*, at improving ICT connectivity in villages (Measuring the Information Society, 2014).

The main goal of the study was to identify, analyze and assess the computerization of companies in the Lubelskie Voivodeship and the relationship between the level of company computerization and its innovativeness. Authors made comparison between rural and urban areas taking into account the characteristics of the company – its size, sectors and operating range.

RESEARCH METHODS

The presented results and the analysis are based on the research project entitled "The Intellectual Capital of the Lubelskie Region 2010–2013." It was conducted by the Statistical Office in Lublin at the request of the Marshal Office of the Lubelskie Voivodeship under Priority VIII Regional Human Resources, Measure 8.2 Transfer of Knowledge, Sub-Measure 8.2.2 Regional Innovation Strategies of the Human Capital Programme for the years 2007–2013.

The research was conducted in 2013 on a representative sample of 650 companies from the Lubelskie Voivodeship, drawn from the National Official Business Register (REGON, Central Statistical Office). An additional criterion for selection was the proportion of companies registered in the voivodeship, with the division into small, medium-sized and large companies, taking into account the specific ratio of each county.

Among 650 surveyed companies 79.5 % were located in cities and 20.5 % were located in rural areas.

Table 1. Characteristics of the research sample

Characteristics		Localization of enterprises		
		Total	Rural areas	City
Business activity	services	38.0 %	27.1 %	40.8 %
	trade	23.7 %	23.3 %	23.8 %
	production	26.8 %	41.4 %	23.0 %
	other	11.5 %	8.3 %	12.4 %
Number of employees	micro	14.9 %	203 %	13.5 %
	little	46.3 %	51.9 %	44.9 %
	medium	30.9 %	24.1 %	32.7 %
	large	7.8 %	3.8 %	8.9 %
Operating Range	locally and region	73.1 %	78.9 %	71.6 %
	country	61.4 %	63.9 %	60.7 %
	EU	32.6%	28.5 %	33.7 %
	world	17.4 %	16.5 %	17.6 %

Source: Survey results

RESEARCH RESULTS

The comparison of the degree of computerisation of rural and urban areas has demonstrated that companies located in rural areas to a greater extent make use of basic computer software (38.3 % of companies) compared to companies located in urban areas (37.3 % of companies). Companies located in urban areas more often make use of specialised software tailored to the business (52.4 % compared to 51.9 % of enterprises in rural areas). 10.3 % of the surveyed companies located in urban areas had in place an integrated IT system, while such a system was implemented in 9.8 % of companies located in rural areas.

The largest number of enterprises operating in rural areas and using basic software is located in the services sector, while companies which benefit from specialised computer software are located mainly in the trade sector, which is presented in Table 2. The degree of computerisation of the company increases with the size of the company. 66.7 % of micro-enterprises use basic computer software, 78.1 % of medium-sized companies use specialised computer software, and up to 80 % of large companies have implemented an integrated information system.

Table 2. Characteristics of the degree of firm computerization against the main profile of activity, number of employees and the range of activities

Characteristics		The degree of computerization of the company from rural areas		
		The company makes use of basic computer software	The company uses specialized software tailored to the business	The company has implemented an integrated information system
Business	services	50.0 %	44.4 %	5.6 %
	trade	35.5 %	61.3 %	3.2 %
	production	30.9 %	52.7 %	16.4 %
	other	45.5 %	45.5 %	9.1 %
Number of	micro	66.7 %	33.3 %	0.0 %
	little	44.9 %	49.3 %	5.8 %
	medium	6.3 %	78.1 %	15.6 %
	large	0.0 %	20.0 %	80.0 %
Operating	locally and region	39.0 %	48.6 %	12.4 %
	country	36.5 %	48.2 %	15.3 %
	EU	15.8 %	57.9 %	26.3 %
	world	31.8 %	45.5 %	22.7 %

Source: Survey results

An analysis of modern ICT technologies in the surveyed companies showed that 53.4 % of companies located in rural areas and 63.8 % of companies located in urban areas own a server. 36.8 % of companies located in rural areas and 30.9 % of companies located in urban areas access the Internet using an analog modem, while respectively 54.9 % and 61.7 % of companies access the Internet via a broadband connection. 35.3 % of companies located in rural areas and 46.8 % of urban companies have a LAN-type internal computer network, 33.1 % of companies located in rural areas and 28.8 % of companies located in urban areas have internal wireless networks and respectively 13.5% and 19.7 % of companies in rural and urban areas have the internal intranet. 1.5% of companies from rural areas and 3.1% of companies from urban areas are connected to the extranet. The use of e-mail accounts for business purposes is quite large – 63.2 % in rural areas and 71.4 % in urban areas. 6.8 % of companies in rural areas use VoIP – voice over IP or ERP, while such systems are used by 8.3 % of companies in urban areas. Companies in urban areas to a greater extent facilitate remote access to corporate resources – such access is provided by 23 % of companies in the cities and 18.8 % of companies in rural regions. Table 3 below presents modern ICTs in the surveyed companies in rural regions by the main profile of activity, number of employees and the range of activities.

Table 3. Modern ICT in the surveyed companies from rural areas against the main profile of activity, number of employees and the range of activities

Characteristic		Modern ICT in the surveyed companies									
		It has a server	It has access to the Internet using an analog modem	It has access to the Internet via broadband	It has an internal computer network LAN type	It has an internal wireless network	It has an internal intranet network	Joined to the outer Extranet link	It uses email accounts to work	It uses VoIP telephony - voice over IP or ERP	It enables remote access to corporate resources
Business activity	services	44.4 %	41.7 %	55.6 %	38.9 %	33.3 %	11.1 %	0.0 %	69.4 %	5.6 %	16.7 %
	trade	58.1 %	25.8 %	45.2 %	29.0 %	25.8 %	12.9 %	0.0 %	48.4 %	3.2 %	12.9 %
	production	58.2 %	40.0 %	56.4 %	34.5 %	38.2 %	12.7 %	1.8 %	67.3 %	10.9 %	25.5 %
	other	45.5 %	36.4 %	72.7 %	45.5 %	27.3 %	27.3 %	9.1 %	63.6 %	0.0 %	9.1 %
Number of employed	micro	22.2 %	48.1 %	37.0 %	11.1 %	25.9 %	3.7 %	0.0 %	44.4 %	0.0 %	0.0 %
	little	47.8 %	30.4 %	58.0 %	30.4 %	29.0 %	8.7 %	1.4 %	59.4 %	7.2 %	13.0 %
	medium	84.4 %	37.5 %	62.5 %	62.5 %	46.9 %	28.1 %	3.1 %	81.3 %	12.5 %	40.6 %
	large	100.0 %	60.0 %	60.0 %	60.0 %	40.0 %	40.0 %	0.0 %	100.0 %	0.0 %	60.0 %
Operating Range	locally and region	53.3 %	32.4 %	58.1 %	33.3 %	29.5 %	16.2 %	1.9 %	65.7 %	6.7 %	18.1 %
	country	62.4 %	38.8 %	56.5 %	40.0 %	40.0 %	15.3 %	2.4 %	67.1 %	10.6 %	23.5 %
	EU	76.3 %	28.9 %	63.2 %	52.6 %	44.7 %	18.4 %	2.6 %	78.9 %	18.4 %	34.2 %
	world	77.3 %	36.4 %	59.1 %	40.9 %	45.5 %	18.2 %	0.0 %	81.8 %	9.1 %	22.7 %

Source: Survey results

Having a website is declared by 60.2 % of companies located in rural areas and 77.2 % of companies located in urban areas. 7.5 % of companies in rural areas and 4.8 % of enterprises in urban areas reported that their websites are under construction. The use of the websites is the most considerable in the trade sector and in other sectors, and it significantly increases with the size of the company – 100 % of large companies declared the utilisation of the website (Table 4).

Table 4. Having a website in the company from rural areas against the main profile of activity, number of employees and the range of activities

Characteristic		Website in the company		
		Yes	It is in the making	No
Business activity	services	55.6 %	11.1 %	33.3 %
	trade	61.3 %	00 %	38.7 %
	production	56.4 %	10.9 %	32.7 %
	other	90.9 %	00 %	9.1 %
Number of employed	micro	55.6 %	0.0 %	44.4 %
	little	50.7 %	10.1 %	39.1%
	medium	78.1 %	9.4 %	12.5%
	large	100.0 %	0.0 %	0.0 %
Operating Range	locally and region	61.0 %	4.8 %	34.3 %
	country	65.9 %	9.4 %	24.7 %
	EU	78.9 %	10.5 %	10.5 %
	world	86.4 %	4.5 %	9.1 %

Source: Survey results

Doing business over the Internet was declared by 57.3 % of companies in rural areas and by 49.4 % of enterprises in urban areas. First of all, business conducted over the Internet is reported mainly in the services sector. Conducting business over the Internet is affected to a small extent by the size of the company. Companies with a larger territorial range of activity to a greater extent conduct their businesses over the Internet. This is evidenced in Table 5.

Table 5. Running a business through the Internet against the main profile of activity, number of employees and the range of activities

Characteristics		Activity through the Internet	
		Yes	No
Business activity	services	58.3 %	41.7 %
	trade	47.4 %	52.6 %
	production	55.6 %	44.4 %
	other	80.0 %	20.0 %
Number of employed	micro	60.0 %	40.0 %
	little	51.2 %	48.8 %
	medium	64.3 %	35.7 %
	large	60.0 %	40.0 %
Operating Range	locally and region	58.0 %	42.0 %
	country	60.9 %	39.1 %
	EU	66.7 %	33.3 %
	world	68.4 %	31.6 %

Source: Survey results

The surveyed companies were asked about the forms of doing business over the Internet. 72.5 % of companies located in rural areas declared that they present catalogues and price lists on the Internet, while this was true for 67.1 % of companies located in urban areas. The forms mentioned included: sending regular newsletters with current packages and special offers (52.9 % and 52.9 % respectively), enabling users to order products or services of their own design (29.4 % and 28.6 %), on-line ordering and reservation, for example, "basket" or "cart" (9.8 % and 26.2 %), website personalisation for regular users (5.9 % and 9.5 %), information about vacancies and the option to send application documents over the Internet (19.6 % and 26.7 %). The forms of conducting business over the Internet by companies located in rural areas by the main profile of activity, number of employees and the range of activities is presented in Table 6.

Table 6. Forms of doing business over the Internet against the main profile of activity, number of employees and the range of activities

Characteristic		Presentation of catalogs and price lists	Newsletter (current offer, promotions)	Allowing users to order products / services according to their own design	Ordering or booking on-line, for example. "Basket" / "trolley"	Personalization of pages for regular users	Information about vacancies and sending application documents through the Internet	Other activities
Business activity	services	64.3%	21.4%	28,6%	7,1%	0,0%	35,7%	14,3%
	trade	44.4 %	66.7 %	55.6 %	22.2 %	11.1 %	11.1 %	0.0 %
	production	85.0 %	60.0 %	25.0 %	5.0 %	10.0 %	15.0 %	0.0 %
	other	87.5 %	75.0 %	12.5 %	12.5 %	0.0 %	12.5 %	25.0 %
Number of employed	micro	88.9 %	44.4 %	11.1 %	11.1 %	0.0 %	11.1 %	0.0 %
	little	71.4 %	52.4 %	33.3 %	9.5 %	4.8 %	23.8 %	9.5 %
	medium	66.7 %	55.6 %	38.9 %	5.6 %	5.6 %	16.7 %	11.1 %
	large	66.7 %	66.7 %	0.0 %	33.3 %	33.3 %	33.3 %	0.0 %

Characteristic		Presentation of catalogs and price lists	Newsletter (current offer, promotions)	Allowing users to order products / services according to their own design	Ordering or booking on-line, for example. "Basket" / "trolley"	Personalization of pages for regular users	Information about vacancies and sending application documents through the Internet	Other activities
Operating Range	locally and region	72.5 %	55.0 %	27.5 %	12.5 %	7.5 %	17.5 %	10.0 %
	country	79.5 %	56.4 %	33.3 %	7.7 %	7.7 %	25.6 %	2.6 %
	EU	68.2 %	54.5 %	27.3 %	9.1 %	9.1 %	40.9 %	0.0 %
	world	61.5 %	69.2 %	38.5 %	15.4 %	7.7 %	38.5 %	0.0 %

Source: Survey results

The conducted study very clearly shows that with increasing computerisation of the company also grows the innovation activity of the companies. This is presented in Table 7.

Table 7. The relationship between the degree of computerization of the company and innovation activities of the company.

Characteristic	design / preparatory activities innovation-related (last year)	implementation of innovation (in the last year)
The company makes use of basic computer software	29.4 %	24.0 %
The company uses specialized software tailored to the business	30.4 %	36.2 %
The company has implemented an integrated information system	46.2 %	46.2 %

Source: Survey results

Different forms of innovations can be introduced, with the basic including the improvement and modernisation of existing products, the introduction of new products, the implementation of new technologies or the introduction of new applications for existing technologies/products/services, the improvement/modernisation of the organisation's management process, the improvement/modernisation of the production process, the introduction of new designs of manufactured products, and the introduction of new trademarks/brands on the market. Table 8 below presents the main forms of innovation, depending on the degree of the company's computerisation.

Table 8. The main forms of innovation, depending on the degree of the company computerization.

Characteristics		The company makes use of basic computer software	The company uses specialized software tailored to the business	The company has implemented an integrated information system
Form of implemented innovation	Improvement, modernization of existing products	7.8 %	11.6 %	23.1 %
	Introduction of new products	11.8 %	20.3 %	38.5 %
	Implementation of new technologies	7.8 %	18.8 %	23.1 %
	Introduction of new applications for existing technologies / products / services	3.9 %	4.3 %	7.7 %
	Changing the method of distribution of products / services	2.0 %	2.9 %	0.0 %
	Improvement / modernization of the organization's management process	2.0 %	7.2 %	15.4 %
	Improvement / modernization of the production process	7.8 %	13.0 %	15.4 %
	Introduction of a new design of manufactured products	2.0 %	2.9 %	7.7 %
	Introduction of a new trade mark / brand on the market	2.0 %	1.4 %	7.7 %
	Other	2.0 %	0.0 %	0.0 %

Source: Survey results

CONCLUSION

The following conclusions can be drawn based on the study and analysis of their results:

1) the degree of computerisation of the company measured by the advancement of the applied ICTs is similar in rural and urban areas with a slight predominance of enterprises located in urban areas. In the countryside mainly basic technology is used, but in the city we can observe the prevalence of more advanced technologies.
2) the greatest degree of businesses computerisation in rural areas occurs in large companies involved in production and focussing primarily on markets in the European Union

3) in the surveyed companies the most visible difference in the use of modern information technology is observed in the method of accessing the Internet. In rural areas there are more companies with analog Internet connection than in the city. This is due to the problem of underinvestment and shortages of broadband connection in rural areas.
4) Another difference arises from the use of Internet for business. Companies from urban areas more often have a website. On the other hand, it follows from the observation of the use of the Internet for the purpose of running a business, that the majority of such companies are located in rural areas. The Internet allows these companies to eliminate the differences resulting from their unfavourable location and distance to potential customers.
5) Having analysed the relationship between ICTs and innovation in rural areas, one can conclude that there is a strong relationship between the degree of the company's computerisation and its innovativeness. The higher the degree of the company's computerisation, the greater the innovative activity both in the preparation phase of innovations and in their implementation. The above is also confirmed by the analysis of the application of different forms of innovation. The higher the level of computerisation of companies, the more often all kinds of innovation appear in the surveyed enterprises.

ICT development in the modern world, where the dominant role in creating competitive advantages is information is a key task for every company that wants to be competitive not only at the local but also at the global market. The advantage of information results in narrowing the gap between urban and rural areas. It is therefore necessary to improve the infrastructure linked with the connection in rural areas, because the use of outdated technologies will increase in the distance to competitors and reduces or even prevents the use of more innovative solutions. One solution to eliminate the delays of technology in rural areas may be the use of EU funds aimed at improving innovation in the economy, especially in the SME sector.

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