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THE ROLE OF INFORMATION SYSTEMS IN DEVELOPMENT OF VOIVODESHIPS IN POLAND

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Abstract: Role of information and Information Systems becomes more and more important for company activity. Their influence on economy of Poland was not researched yet. Usage of Information and Communication technology rapidly increased for the past years. The research goal of the article was evaluation of dependency between development of ICT and economic situation of voivodeships in Poland.

Keywords: information, economics of information, Information Systems (IS)

ECONOMICS OF INFORMATION AND INFORMATION SYSTEMS

Economics of information is one of groundbreaking change in economy. Digital revolution became new economic revolution, sometimes called the third industrial revolution [Varian 2002].

Economics of information took first beginning from 1960 by Stigler[1] and and from 1962 by Machlup.[2] Stiglitz worked with the problem of imperfect information on the market. If information is not perfect, market equilibrium does not exist. According to Stiglitz it is possible to decrease the level of imperfect information by proper expenses [Stiglitz 2013, Żelazny 2014, Petrovska 2014]. These expenses are connected with possibility to get right-time, clear and truthful information.

[1] Stigler G. (1961) The Economics of Information, The Journal of Political Economy, Vol. 69, pp. 213-225.
[2] Marchlup F. (1962) The Production Distribution of Knowledge in the United States, Princeton University Press.

New institutional economy put transaction costs on the first place at the analysis, to which are also included costs of information [Daniłowska 2007].

One of the way to decrease the transaction costs by company can be introduction of proper Information System.

Based on nowadays development of Information Technologies, it is not possible to skip evaluation of their influence on economy.

Plenty of articles were already written about the benefits from the using of Information Systems. Some of these researches confirmed that Information Systems have positive influence on company development, some of them do not agree with it. For example Oliner and Sicher[3] said that computers have no influence on economic development. Some economists say that investments in IS are not always profitable. There are still continued discussions if companies which use IS gain comparative advantage [Carr 2003, Masli et al. 2011]. Lin in his work said that IS has no positive influence on business value [Lin 2009]. Based on results from works of Barua, Kriebel and Mukhopadhyay[4], it can be concluded that company, which invests in IS gains economic efficiency [Romero 2014].

Among the newest research works it should be mentioned the book of Schiller "Digital depression: information technologies and financial crisis", where author demonstrates digital technology's central role in the global political economy development processes. Especially author connected it to the financial, production and military networks [Schiller 2014].

Company introduces Information System in purpose to increase its competitiveness. It can be defined the following advantages such as increasing production flow, shortening time delivering, increasing sales and so on [Parlińska et al. 2013].

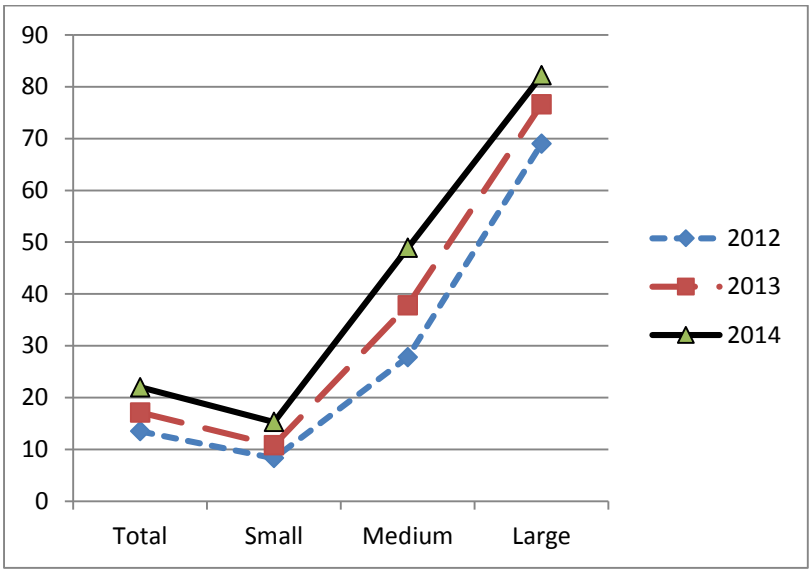
THE USE OF INFORMATION SYSTEMS BY ENTERPRISES IN POLAND

Information is the main element of Information System. In economic sciences the Information System is defined as set of actions to collect, store and disseminate information in purpose to succor decision making process [Borkowski 2003].

[3] Oliner S., Sichel D. (1994) Computers and output growth revisited: how big is the puzzle?, Brookings Paper on Economic Activity, Vol. 25, No. 2, pp. 273-334.

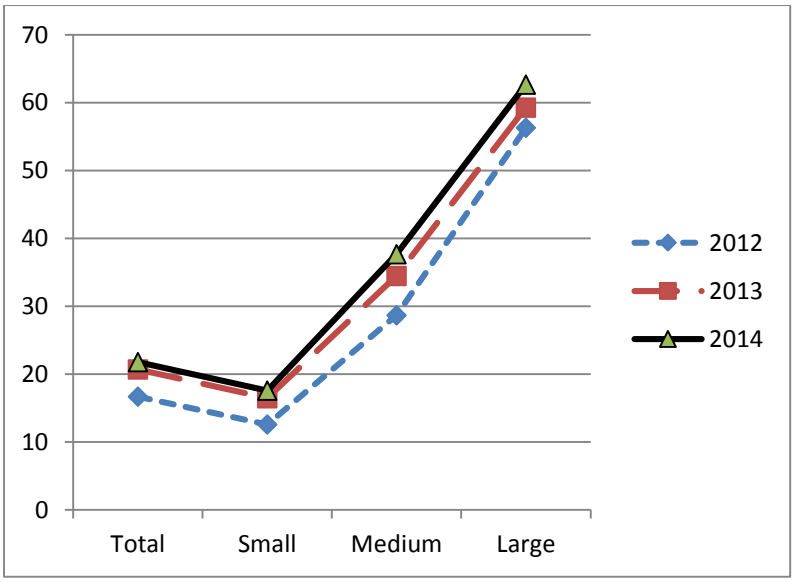
[4] Barua A., Kriebel C., Mukhopadhyay T. (1995) Information technology and business value: an analytic and empirical investigation, Information System Research, Vol. 6, No. 1, pp. 3-24.

Figure 1. Usage of ERP in Poland by company size [%]



Source: made by Author using data from statistical reports "Społeczeństwo informacyjne w Polsce"

Figure 2. Usage of CRM in Poland by company size [%]



Source: made by Author using data from statistical reports "Społeczeństwo informacyjne w Polsce"

In general in Poland there are used two systems which allow automatic share of information between different departments within the enterprise: Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM). ERP is used for planning and managing company activity such as accounting, production, marketing and so on. Customer Relationship Management is used for managing the information about clients.[5]

Table 1. Usage of ERP and CRM in Poland by types of economic activity

Specification	Enterprises using system %					
	ERP			CRM		
	2012	2013	2014	2012	2013	2014
Manufacturing	15.9	20.6	25.2	16.0	20.2	20.6
Electricity, gas, steam and air conditioning supply	31.7	35.8	48.4	28.2	24.2	31.4
Water supply; sewerage, waste management and remediation activities	14.5	21.2	30.5	23.3	24.1	29.1
Construction	6.2	6.7	10.8	8.0	9.1	9.6
Trade; repair of motor vehicles	17.0	20.0	24.1	21.6	26.5	26.4
Transportation and storage	9.2	12.5	18.0	14.8	17.4	18.7
Accommodation and catering	6.2	6.7	12.4	6.8	14.6	17.3
Information and communication	19.0	36.4	45.5	34.8	52.1	57.2
Financial and insurance activities	19.0	24.9	28.0	54.3	54.7	55.0
Real estate activities	9.5	12.5	23.2	17.8	16.9	21.4
Professional, scientific service activities	11.4	16.6	20.9	17.5	20.4	24.4
Administrative and support service	10.7	14.4	19.9	17.3	20.5	21.6
Repair of computer and communication equipment	27.7	35.5	33.8	40.0	48.4	46.8

Source: Statistical reports „Społeczeństwo informacyjne w Polsce”

Based on data from Statistical Office, which is shown in Figure 1 and 2, it can be noticed growing tendency of using ERP and CRM by enterprises in Poland from 2012 to 2014. The biggest share of using these systems belongs to large companies. In 2014 it reached more than 80 % for ERP and more than 60% for CRM.

According to type of economic activity, ERP and CRM are used the most in information, communication, insurance and finance activity (Table 1). Mostly in each type of activity it is observed notable growth of using these systems (especially if to compare year 2012 with 2014).

[5] Statistical reports (2012, 2013, 2014) “Społeczeństwo informacyjne w Polsce”, Central Statistical Office of Poland, Warszawa.

RANKING OF VOIVODESHIPS ACCORDING TO ECONOMIC AND ICT DEVELOPMENT USING HELLWIG METHOD

In the empirical part of the article, it was made comparison of voivodeships' economic and ITC development and evaluated relation between them.

Based on background of new institutional economics, which says that costs of information belongs to transaction costs and can be reduced by proper expenses (in our research – expenses for ICT), as dependent variable it was chosen voivodeship's economic development of enterprises, as independent – development of ICT. Number of observations is equal to 16.

In purpose to make ranking of voivodeships' economic situation of enterprises there were chosen the following variables, connected with their economic activity:

- Level of unemployment in voivodeship,
- Number of enterprises in voivodeship,
- Average salary in voivodeship,
- Average enterprise's income in voivodeship.

In purpose to make ranking of ICT usage in voivodeships there were chosen the following variables, connected with using of information and telecommunication systems by enterprises:

- Using of ERP by enterprises,
- Using of CRM by enterprises,
- Enterprises receiving orders via computer network,
- Enterprises receiving/sending e-factures,
- Share of enterprises, which use computers,
- Share of enterprises with Internet access,
- Enterprises providing portable devices to the employers.

Hellwig methodology allows to make ranking of observations based on synthetic measure of object's distance from theoretical standard of development [Parlinska et al. 2014].

Using Hellwig method, there was made a ranking of voivodeships according to their economic and ICT development. All data for calculations was taken from statistical reports of year 2013.

Table 2. Hellwig measures

Voivodeship	Hellwig measure of ICT development	Hellwig measure of economic development
Mazowieckie	0.785695	0.935069
Dolnośląskie	0.64392	0.516134
Śląskie	0.605156	0.525213
Pomorskie	0.448798	0.506155
Podlaskie	0.434099	0.255387
Małopolskie	0.412305	0.487596
Opolskie	0.400786	0.281285
Łódzkie	0.390058	0.378291
Kujawsko-pomorskie	0.356221	0.289714
Zachodniopomorskie	0.347572	0.278421
Wielkopolskie	0.292489	0.556026
Podkarpackie	0.285461	0.273039
Lubuskie	0.266336	0.257155
Lubelskie	0.248223	0.282421
Warmińsko-mazurskie	0.133952	0.133591
Świętokrzyskie	0.012142	0.246839

Source: made by Author using data from statistical reports of Central Statistical Office of Poland

After making regression analysis, it was calculated that relation between economic development of the region and the use of ICT is significant ($p<0,05$, model is $y = 0,08 + 0,81 \times x$, R = 0,79, F = 22,87). Based on this results it can be made conclusion that together with the rise of using ICT, economic indicators of enterprises in the region also increase.

CONCLUSIONS

With rapid development of Information Systems in business it became not possible to make evaluation of economic situation of enterprises in the region, without taking them into account. In this research the background was taken from new institutional economics, that is why as the independent variable it was chosen ICT development in the region, which has influence on economic situation of enterprises in the region.

Using Hellwig method the measures of development were calculated. As a result of regression analysis, it was obtained significant dependence between dependent and independent variables, which means that using of information and communication technologies has positive influence on economic development of enterprises in the voivodeships of Poland.

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