THE ANALYSIS OF THE INFLUENCE OF THE INFORMATION SOCIETY'S DEVELOPMENT ON THE ECONOMIC PERFORMANCE IN REGIONS OF BELARUS

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Abstract

This article presents the results of the analysis of the relationship between the information society development and the economic performance. The analysis was carried out using the regional indices of the Republic of Belarus in 2011 (Minsk excluded). The study considered 16 indicators which were grouped into three main factors. Only the first factor was found to have a significant relationship with the gross regional product according to the Spearman correlation coefficient.

1 Introduction

The issues of the information society development seem to be important in both Belarus and Russia and many studies tried to assess the status of information society not only at the federal level, but also at the regional level. The need to align the level of the information society development in various jurisdictions also confirms the importance of this research.

Although it is interesting to use ratings in order to compare the levels of information society development, it is also important to assess its impact to the economic performance. The purpose of this paper is to study the influence of the level of information society development on economic performance in the regions of the Republic of Belarus. To achieve the goal we take the following steps:

1) examine the main indicators of the information society and collect data of the regions of the Republic of Belarus;

2) convolute the criteria by using factor analysis;

3) determine the influence of the main factors in the information society development on economic performance;

4) draw conclusions and make recommendations aimed at improving development of the information society in the region.

2 Section of the Paper

The information society is a model of post-industrial society with a dominant role played by knowledge and information, and the widespread usage of information and communication technologies (ICT). Therefore, its effectiveness is evaluated in the same

way as the efficiency of the economy as a whole. The main economic indicator at the regional level is the gross regional product (GRP). There are several techniques for evaluating the level of the information society development. The methodology of world information society rating cannot be used in its original form for analysis of the information society at the regional level of the Republic of Belarus. Thus, the system of indicators measuring the level of the information society development in the regions of the Republic of Belarus was proposed in [1]. It is based on the Information Society Development Strategy [2] takes into account regional differences and includes five groups of indicators. We use the official data on 16 indicators of the information society development in the Republic of Belarus in 2011.

Obviously, the differences across the regions arise not only because of different degree of the information society development, but also due to other factors such as the value of the territory, the population size, etc. Therefore, we used the values of relative indicators in our analysis.

We have data for each region and the Minsk city. Since the values of most indicators for Minsk are higher than those in other regions, we feel that it is appropriate to exclude Minsk from the analysis.

Indicators have different measurement scale. Therefore, before applying the methods of econometrics and applied statistics we do normalization using formula (1) for the indicators with a positive trend (the more the better), and formula (2) for the indicators with a negative trend (the less the better):

$$z_{ij} = \frac{x_{ij}}{max x_{ij}} \tag{1}$$

$$z_{ij} = \frac{1/x_{ij}}{max(1/x_{ij})} \tag{2}$$

Since we have only 6 cases (by regions) and 16 indicators it is impossible to use correlation and regression analysis. Using factor analysis can reduce the number of indicators. We can receive a few major factors that retain a certain percentage of the variance of data. The results of the factor analysis are presented in Table 1.

Table 1: The results of correlation analysis.

	Factor loadings		
Variable	Factor 1	Factor 2	Factor 3
The average annual share of households with Internet access	0,385034	**0,772713**	0,494439
Average bandwidth traffic	0,262073	**0,655638**	-0,461210
Investments in fixed capital of ICT, billion rubles (per ICT organization)	**0,976857**	0,071734	0,079320
Computers per school	0,092175	**0,938504**	0,009400
The number of firms using PCs	**0,764902**	-0,212537	0,265388
The share of firms with a website	**0,914027**	0,337871	-0,089838
The share of firms with access to the Internet	0,108641	**0,963767**	0,219082

The share of firms with local networks	0,537399	**0,834425**	-0,069061
The share of employees with a PC	**-0,887447**	-0,398344	-0,145028
Shares of specialists with higher education	0,077105	**-0,910354**	0,036664
The share of employees with access to the Internet	**0,813194**	0,346626	0,221802
Share of ICT firms using electronic document	-0,222850	0,011328	**-0,805265**
The number of cyber-crimes per one household with Internet access	**-0,913820**	0,028457	0,375477
The share of ICT firms among the organizations	**0,944158**	0,181366	-0,192010
Average GVA per 1 ICT firm	0,094221	-0,114307	**0,944864**
The average cost per 1 ICT firm	**0,825679**	-0,278976	0,367452
Expl.var.	6,822378	4,929622	2,520498
Prp.Totl	0,426399	0,308101	0,157531
Source: author's own development.			

In our case, the first factor retains 42.64% of the variance, the second -30.81%, the third factor - 15.75%. Together, they comprise 89.2% of the original variance. It is possible to calculate an integral index as a combination of these factors. It may be called the level of information society development of the region with the methodology by V. Lyalikova [3]. But the purpose of this paper is to determine the extent of the impact of these factors on the GRP.

We used the nonparametric Spearman's correlation coefficient for assess the relationship, since the number of cases is small. The results are shown in Table 2.

Table 2: The results of correlation analysis.

Pair of Variables	Valid N	Spearman R	-level	Comment
Factor 1 and GDP	6	0,942857	0,004805	Correlation is significant, positive
Factor 2 and GDP	6	-0,2	0,704	Correlation isn't significant
Factor 3 and GDP	6	0,085714	0,871743	Correlation isn't significant
Source: author's own development.				

From this table we can conclude that the correlation of GRP is observed only with the first main factor. Thus the indicators that are included in the first major factor are strongly correlated with the GRP, and the indicators of the second and third factors have weak interrelation.

The first factor is determined by the work of the ICT sector. Thus, the results of the ICT sector largely determine the efficiency of the economy. Information industry is seen as a major area of economic growth in Belarus. We had analyzed the relationship between the indicators in the first factor. We can conclude that the number of ICT organizations and the proportion of firms with PCs and the websites have an inverse

relationship with the number of reported crimes in the sphere of high technologies. Taking into account the fact that this indicator was normalized by (2), such regions have more active cyber-crime. The environment of regions conditions for cyber-crime.

The second factor mostly contains indicators of the Internet usage (at home or at work). Currently, there is an easy access to information resources for businesses and households. This is reflected in the availability of schools and businesses PCs, low-cost access to the Internet and the ever-increasing bandwidth transmission of Internet traffic.

The third factor includes two variables: the share of the ICT sector companies that use electronic documents and average ICT sector's gross value added per firm. These factors have the least impact on the level of the level of information society development. That is why they have no effect on the value of the GRP. This can be explained by the weak development of electronic documents usage in the country [3, p. 27].

Thus, there is interdependence between the efficiency of the economy and the level of the information society development only in the information industry's development. In this regard, it makes sense to encourage the development of the ICT industry in the country by attracting investment and expanding the use of information technology. The research also confirms that there is a high degree of differentiation of Belarus' regions in terms of the information society development.

In the future, it would be interesting to study the information society development in the dynamics. To make this possible it is necessary to improve the legislation in the field of statistics and reporting the results in the information sector.

3 Bibliography typesetting

References

[1] Novickaya, E. (2012). The system of indicators to measure the information societys development in the regions of the Republic of Belarus. *Economics and Management*. Vol. **4(32)**, pp. 10-16.

[2] Strategy for Information Societys Development in the Republic of Belarus for the period up to 2015 //Council of Ministers of the Republic of Belarus 1174 from 09.08.2010.

[3] Lyalikova, V. (2010). Methodological aspects of economic ranking objects using the methods of applied statistics. *Vesnik of Yanka Kupala State University of Grodno. Series 5. Economy.*. Vol. **2**, pp. 29-35.

[4] G. Sosnowski, B. Zhelezko, T. Tkalich (2010). Evaluation of ITs efficiency: contemporary approaches. *It Bel*. Vol. **7-8**, pp. 27-30.

[5] The Information Society in the Republic of Belarus. (2012). *Statistical Yearbook*, Minsk.