SELECTION OF INDICATORS OF INFORMATION SOCIETY DEVELOPMENT

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Abstract

This paper examines problem of the evaluation of the information society development. The information society is a complex phenomenon and the evaluation of its development is highly complicated. Some indicators are quite similar, others are unrelated, and therefore it is very difficult to interpret the information reflected by the indicators. This article presents the results of a research aimed at identifying the main indicators of the information society development.

Key words

Information society, evaluation of development, system of indicators.

1. Introduction

Transition is taking place worldwide from the industrial age to the information one, and knowledge and information, alongside capital, labour and natural resources, are becoming the strategic resources of a state. New technologies are changing the content of traditional professions; new jobs are being created; the market, culture, politics and other areas are undergoing changes. The formation of the information society is a topical objective for all countries of the world, including Lithuania, and the development of the information society is becoming a strategic task. In 2000, the Lisbon strategy was adopted setting a goal for Europe for the next decade – to make the European Union "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion". It has recognised the urgent need for Europe to exploit the opportunities of the knowledge-based economy and in particular the Internet. In response to this need, the "*e*Europe" Action Plan was launched in 2000 in Feira and was later joined by the countries of Central and Eastern Europe. For the countries to be able to evaluate the information society development and compare each other's progress as well as to exchange information on advancement in this area, a system of indicators of the evaluation is required. Hence, the aim of this article is to conduct an analysis of indicators of the evaluation of the information society development.

To define the concept of the information society is a rather complicated task, which is determined by the complexity and speed of this process. In broad terms, the information society may be characterised as a society in which information plays a particularly significant role, information is exchanged freely and intensively, information is valued and exchanged by means of information telecommunication technologies. The phenomenon of the concept of the information society has been thoroughly studied by F. Webster (Webster, 1975). In his opinion, five concepts of the information society are possible: technological, economic, professional, spatial and cultural. The advent of the information society has been forecasted by such well-known scientists as A.Toffler, D.Bell, Y.Masuda, etc. (Takagi, 1997). Some of them have claimed that it is man himself who creates the information society, while others believe that this is a technological revolution which is going to radically change man's life (Bell, 1976). A. Toffler has presented a widely known "three waves" conception (Toffler, 1980). The first wave is the agrarian society. It was formed at approximately 8000 B.C. and lasted until the 18th century A.D. At the same time the second wave became dominant. The second wave is the industrial society. The industrial society, which gradually supplanted the agrarian society, lasted for a much shorter period of time than the agrarian one. The industrial society is undergoing inevitable changes; the

third wave is rising. The third wave is the information society. This period started during the last decades of the 20th century.

A. Toffler calls the information society the greatest social revolution and creative reshape of all times. As the main feature of the information society M. Castells (Castells, 1996, 2003) identifies a striking increase of the volume of information, which leads to the necessity to create integrated information and telecommunications systems. The ITT technologies are becoming a considerable force determining the society development, provided it will be able to make use of the opportunities which are created by the new technologies (Castells, 1996, 2003; Drucker, 2001; Paliulis, Chlivickas, Pabedinskaitė, 2004).

The information society is developing by certain cycles beginning with the creation of a vision and finishing with the implementation of prepared action plans. During this process, the level of the information society development is being evaluated, targets and objectives are being formulated and means of achieving the goals are being selected. An important part of this process is the evaluation of the current situation. There are different methods of the evaluation of the level of the information society development each employing for this purpose various indicators. The article examines three projects devoted to the evaluation of the information society development: 1. "*e*Europe + 2003"; 2. "Digital Lithuania"; 3. "Factors and Impacts in the Information Society: a Prospective Analysis in the Candidate Countries" and the indicators of evaluation of the information society development as employed in them.

1. "*e*Europe + 2003". In 2000, the Lisbon European Council adopted the Lisbon strategy setting the strategic goal for Europe for the next decade – to make the European Union "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion". It has recognised the urgent need for Europe to exploit the opportunities of the knowledge-based economy and in particular the Internet. In response to this need, the "*e*Europe" Action Plan was launched in 2000 in Feira. The same year, the countries of Central and Eastern Europe recognised at the European Ministerial Conference held in Warsaw the goal set in Lisbon by the fifteen Member States of the EU as their strategic goal and resolved to prepare a similar plan named "*e*Europe +". This plan has been prepared by the candidate countries with the assistance of the European Commission. All countries have evaluated the information society development according to the same methods ("*e*Europe +2003", 2004).

2. "Digital Lithuania 2001" – the first complex sociological research of the Lithuanian information society conducted upon the order of the Open Society Fund Lithuania by the Market and Opinion Research Centre "Vilmorus". The Information Society Study Centre at Vilnius University has prepared research methodology and performed the analysis of its results. This research was carried out in 3 stages; during each stage, more than 1000 persons were interviewed by the method of an interview at respondent's home. The research took place in 18 Lithuanian towns and 56 rural areas. (Šaulauskas, 2001).

3. The implementation of the project "Factors and Impacts in the Information Society: a Prospective Analysis in the Candidate Countries" was completed at the beginning of 2004. The aim of this project – to make an in-depth analysis and identify ambiguities and challenges related to EU enlargement: technological, economic, political and social drivers and their impact on science and technology policy, competitiveness and employment in the wider Union over a ten-year horizon. The topic of the information society has been chosen, because the governments of the candidate countries have recognised its development as a high priority (Informacinės visuomenės iššūkiai, 2004).

The projects "*e*Europe + 2003" and "Digital Lithuania 2001" evaluate the information society development by employing certain selected indicators. When comparing the indicators employed by these projects, it may be noticed that all indicators have been divided into different groups, though the majority of the indicators themselves are similar, for instance, such as the use of computers and the Internet. Both the division into different groups and differences in some indicators have been probably determined by different objectives of the two researches. The purpose of the indicators of "*e*Europe + 2003" has been to monitor the progress made in the implementation of the "*e*Europe + 2003" Action Plan and advancement of the EU countries towards the main goal. Moreover, the "*e*Europe + 2003" indicators have been specifically intended to evaluate the development of the current stage of the information society. Another stage is going to employ other indicators, and it remains unknown whether the same evaluation method is going to be selected. The second project attempted to look at the information society development through the eyes of population. The indicators employed by the research "Digital Lithuania 2001" tend to

reflect the public opinion of the information society development, because it is the population that should feel and evaluate the changes brought about by the information society in all areas of life. It is the residents of a country that should be the real indicators of the information society development. The research "Digital Lithuania 2001" aims at establishing not only the level of the use of computers or the Internet and the nature of their use, but also the perception of the information society by the public, whether it hopes and believes the creation of the information society to be necessary, the way it evaluates the current stage of the information society development in Lithuania. Therefore, this research may be claimed to evaluate the information society development not only quantitatively, but also qualitatively.

It is worth noting that the third project, "Factors and Impacts in the Information Society: a Prospective Analysis in the Candidate Countries" (Informacinės visuomenės iššūkiai, 2004) understands the information society in a much broader way, and the information society is evaluated by qualitative rather than quantitative methods. Each of the areas is evaluated by carrying out a SWOT analysis, i.e. by identifying in each area its strengths, weaknesses, opportunities and threats. Having so evaluated the information society, a more thorough and detailed view is received, but it becomes rather complicated to compare the obtained results with the results of evaluation by other countries.

It is confusing to decide which of the above-mentioned methods is better suited for the evaluation of the information society development. It may be expedient to employ a variety of methods to evaluate such a complex and dynamic phenomenon, the very concept of which is broad and interpreted differently by different authors. Although due to continuously changing conditions, a different stage of the information society development in each country and the specific character of each country it is complicated to formulate a uniform methodology to evaluate the information society development in all country. However, one cannot doubt that it is advisable to examine different aspects of this phenomenon and analyse the indicators reflecting the information society development.

2. Analysis of indicators of the information society development

When implementing the "eEurope +" Action Plan, the Member States of the EU and the candidate countries annually calculate, on the basis of a uniform methodology, the indicators reflecting the ISD (information society development). The "*e*Europe + 2003" Action Plan identifies 58 indicators evaluating the ISD. The research employs the ISD indicators from 10 EU candidate countries (Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia and Slovakia) for the year 2003. The process of the selection of the indicators of the evaluation of the ISD consists of four stages: I. Identification of the ISD areas, determination and classification of the indicators evaluating the ISD; II. Collection of statistical data of each indicator evaluating the ISD; III. Establishment of the methods of selection of the indicators evaluating the ISD; IV. Selection of the indicators–representatives to evaluate the IS development by carrying out a qualitative and quantitative analysis (Pabedinskaitė, Deržanauskienė, 2004). After analysis of indicators of the information society development, 21 indicators have been selected out of 58 indicators as used in the "eEuropa+2003" project report.

They are divided into three groups and 13 subgroups:

I. Infrastructure and availability of communications ("Telecommunications infrastructure"; "Digital divide"; "Availability of communications"; "Security");

II. Capacities and skills ("Digital literacy"; "Public Internet access points);

III. Stimulation of the use of the Internet ("Use of the Internet and frequency of use"; "Place of Internet access"; "Purpose of the use of the Internet"; "eBusiness"; "eGovernment"; "eHealth"; "Obstructions to the use of the Internet").

The subgroups contain from one to eight indicators. Selection of the indicators – representatives to evaluate the information society development was made by carrying out a qualitative and quantitative analysis. The typical indicators of the evaluation of the information society development are related with the use of a computer or the Internet and their availability; hence we are going to discuss in greater detail the subgroup "Availability of communications".

The indicators of this subgroup show either the use of a computer/Internet (the indicators Respondents having a computer at home; Respondents having at home a computer connected to the Internet; Internet users) or a financial possibility of using them (the indicators Possibilities to purchase a computer in relation to income per month; Relation of price of 20 hours of dial up connection at the peak time to income of a household per month; Relation of average expenditure on Internet services to income

of a household per month). The indicators Respondents having a computer at home and Respondents having at home a computer connected to the Internet reflect both the willingness of users and their financial possibilities to purchase a computer and/or use the Internet. Meanwhile, the indicators Possibilities to purchase a computer in relation to income per month, Relation of price of 20 hours of dial up connection at the peak time to income of a household per month and Relation of average expenditure on Internet services to income of a household per month reflect the financial possibilities of purchasing a computer and using the Internet, but do not show the willingness or intention of doing this. The indicator Internet users reflects the use of the Internet in general. The indicators which show the willingness and possibility of a user more accurately reflect the subgroup of indicators "Availability of communications" rather than the indicators which only reflect such a possibility.

The correlation analysis has shown (Table 1) that stochastic relationships between the subgroup's indicators are sufficiently strong, which implies that the number of the indicators characterising the subgroup "Availability of communications" may be reduced. The indicator *Respondents having a computer at home* has an elastic correlative relationship with four (out of the remaining 5) indicators in the group (though unsurprisingly, strong relationships exist with the indicator *Respondents having at home a computer connected to the Internet*).

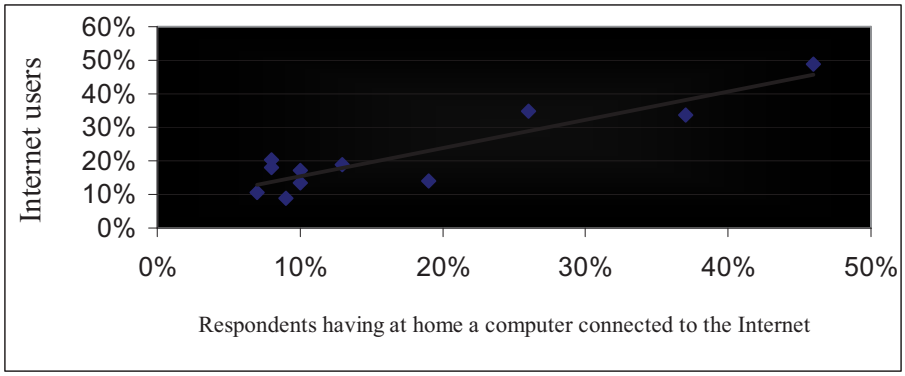
Table 1. Mutual correlation between indicators of the subgroup "Availability of communications"

	AVAILABILITY OF COMMUNICATIONS					
	Possibilities to purchase a computer in relation to income per month	Respondents having a computer at home	Respondents having at home a computer connected to the Internet	Internet users	Relation of price of 20 hours of dial up connection at the peak time to income of a household per month	Relation of average expenditure on Internet services and income of a household per month
No	**1**	**2**	**3**	**4**	**5**	**6**
1	1	-0,5490	-0,4732	-0,4696	0,2184	0.4799
2	-0,5490	1	0,9296	0,8932	-0,8214	-0,7374
3	-0,4732	0,9296	1	0,9422	-0,8428	-0,5288
4	-0,4696	0,8932	0,9422	1	0,9226	0,6422
5	0,2184	-0,8214	-0,8428	-0,9226	1	0,5906
6	0,4799	-0,7374	-0,5288	-0,6422	0,5906	1

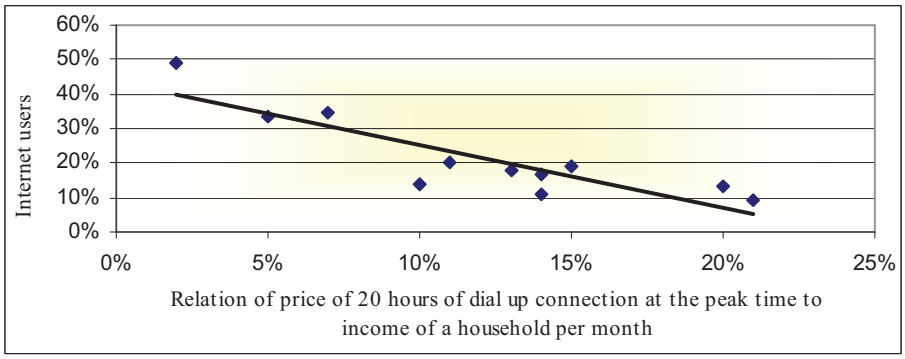
The indicator *Internet users* has an elastic correlative relationship with three indicators of the subgroup and is more generalising, because the Internet can be used not only at home. Therefore, this indicator could become the representative of the indicators of this subgroup in the system of the indicators evaluating the information society development. As it has been mentioned above, the indicators of this subgroup describe various aspects of the application of information technologies and telecommunications – the level of the use of computers in a country and the financial features of this use, so two indicators may be logically selected in this subgroup. The financial indicator with which the indicator *Internet users* has the largest correlation coefficient (0,923) is *Relation of price of 20 hours of dial up connection at the peak time to income of a household per month* (%). This indicator must also be noted to have an elastic correlative relationship with four (out of other 5) indicators in the subgroup.

The results of a simple regression analysis made between the indicator *Internet users* Y and the indicators X_1 (*Respondents having at home a computer with launched Internet access*) and X_2 (*Relation of price of 20 hours dial up connection at the peak time and income of a household per month*) are

presented in Pictures 2 and 3. Regression lines are respectively: $Y = 0{,}0686 + 0{,}8462\ X_1$ and $Y = 0{,}4374 - 1{,}8363\ X_2$.



Picture 2. Dependence of the indicator Internet users on the indicator *Respondents having at home a computer connected to the Internet.*



Picture 3. Dependence of the indicator *Internet users* on the indicator *Relation of price of 20 hours of dial up connection at the peak time to income of a household*

An evident dependence of the number of users of the Internet on the comparative price of its use allows carrying out a quantitative analysis of the consequences of fluctuations in the price of the use of the Internet and income of the population.

The analysis of indicators of the information society development according to the subgroup "Availability of communications" clearly shows the complexity and ambiguity of the selection of the system of indicators of evaluation of the subject of this research. When conducting such an analysis, one may not limit oneself to the examination of the stochastic relationships existing between indicators in subgroups, it is also advisable to analyse inter-group relations, because indicators of evaluation which are close according to their meaning are use in different subgroups.

Conclusions

For the purpose of the evaluation of the information society development, different projects make use of different methods and different indicators, which complicates the comparative analysis of information society development in different countries.

When creating a system of indicators which would sufficiently fully reflect the level of the information society development and would simultaneously is easy to overview and convenient to apply in practice, it may be expedient to conduct a qualitative and quantitative analysis of stochastic relations between the indicators of evaluation. A correlation regression analysis of stochastic relationships between indicators provides for a possibility of not only evaluating the level of the information society development, but also influencing this process by regulating controllable factors.

The analysis of indicators of the information society development clearly shows the complexity and ambiguity of the selection of the system of indicators for evaluation. When conducting such an analysis, one may not limit oneself to the examination of the stochastic relationships existing between

indicators in subgroups, it is also advisable to analyse inter-group relations, because indicators of evaluation which are close according to their meaning are use in different subgroups.

After carrying out a qualitative and quantitative analysis of indicators for evaluation of the information society development, 21 indicators have been selected out of 58 indicators as used in the "eEuropa+2003" project report. A system of indicators of such a scope can be more easily overviewed and makes it easier to conduct a comparative analysis according to different countries and the evaluation of the level of the information society development.

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Summary

In this paper problem of the evaluation of the information society development has been examined. The information society is a complex phenomenon and the evaluation of its development is highly complicated. For the purpose of the evaluation of the information society development, different projects make use of different methods and different indicators, which complicates the comparative analysis of information society development in different countries. Some indicators are quite similar, others are unrelated, and therefore it is very difficult to interpret the information reflected by the indicators.

In this article the results of a research aimed at identifying the main indicators of the evaluation of the information society development are presented. After carrying out a qualitative and quantitative analysis of indicators of the information society development, 21 indicators have been selected out of 58 indicators as used in the "eEuropa+2003" project report. A system of indicators of such a scope can be more easily overviewed and makes it easier to conduct a comparative analysis according to different countries and the evaluation of the level of the information society development. A correlation regression analysis of stochastic relationships between indicators in the groups und subgroups provides for a possibility of not only evaluating the level of the information society development, but also influencing this process by regulating controllable factors.

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