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Innovative Computer Technologies for Estimating the Level of Economy Safety: Evolution, Current State and Prospects

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Abstract

This article provides a system analysis of trends in the IT field of the global computer industry that changed the socio-economic conditions of everyday living. In particular, we describe such innovative software as Deductor Studio, Statistics, MS Exel, SPSS, Statgraphics, MapInfo, Mathcad, MatLab, Analyst, Model Economic Equilibrium and Automated Information Systems that are necessary for the implementation of production and circulation in the Enterprise Resource Planning(ERP), which has made it possible to show significant benefits of Statistics10 in the economy.

We have scientifically proven that in the next 10 years, there will be a new perspective towards developing a system which will be based on software system Statistics, innovative technologies for complex service of e-commerce, which will be one of the main types of business in the development of a global network protocols of electronic data interchange, electronic auctions etc.

Keywords: evolution, innovative technology, software system, development strategy, strategic priorities, economy safety

Development of Computer Science

For the past 10–20 years, a number of revolutionary Information Technology inventions were made in the global computer industry that contributed to the quantitative and qualitative changes in socio-political and economic processes. Self-development and self-education became irreplaceable foundations for economic growth of any kind of business.

It is pertinent that the fundamental principles of formation of innovative computer technologies in the economy, in particular, were developed by scientists such as Kantorovich (1972), Zhaldak (Zhaldak, Kuzmina, Mihalin 2009), Konovalov, Mashbits, Herhey i Iurkivska (Iurkivska, 2010), Hladchuk, Pidlasii,

Brushlinskiy i Buul (Buul, Tsefel, 2005), Gabii, Matiushkin i Duk (Diuk, 1997), Mashbyts, Tikhomirov, Mashbyts, Tikhomirov i Bratushka (Bratushka, 2009), Patsyorkovskii, Romakin i Pavlenko (Pavlenko, 2014), Ivakhnenkov, Lieberman, Kindratska, Mnih and others.

Considering the high rate of development of information society, we shall review the defining moments which contributed to the increase of automation of production.

The first defining moment conventionally denotes the period 1874–1944 when there was increased use of calculating machines, slide rules and other mechanical tools to perform basic arithmetic operations in business and in everyday life. In the same period, punch cards were invented and punched-card computers were used widely for processing and storage of data bases.

The second defining moment (1945–1968) is associated with the creation of a universal computer, including the first computer ENIAK and the high--performance machine "Arrow", which was characterized by compact and relatively low cost. The invention and use of transistors and integrated circuits, which were actively utilized from 1968, became another important event for further development of computers.

The third defining moment (1990–1999) is related to the development of analytical systems that can operate in an environment of local area networks(LAN), which contributed to the development of such software as 1C, Galaxy, Infosoft, Deductor Studio, Statistics, MS Exel, SPSS, Statgraphics, MapInfo, Mathcad and others.

The fourth defining moment was the beginning of the XXI century and characterized by the creation of modern analytical systems that integrate well with the basic software of the customer and communication satellite.

Depending on the speed of operation, there is a certain analogy between the above-mentioned evolution and the four generations of computers which were based on:

- radio tubes,
- transistors,
- integration circuits,
- microprocessors.

Application of Computer Science to the Economy

Considering the great variety of innovative software tools with the help of which a number of important socio-economic processes are being investigated, (Deductor Studio, Statistics, MS Exel, SPSS, Statgraphics, MapInfo, Mathcad, MatLab, Model of economic equilibrium and automated information systems of ERP (Enterprise Resource Planning)), we shall particularly focus on examples

of usage of “Statistic 10” package in the economy, because in third world countries most companies in 2015 did not make use of computer technologies (except basic functions of MS Exel).This is primarily due to the lack of appropriate financial and material resources and available visual guidelines on the use of new computer technologies.

The Use of Statistics 10 Software

In this regard, we give a generalization of methodological proposals presented by previous worker (Bratushka, 2009; Pavlenko, 2014; Gladchuk, 2013) and from our own experience of using “Statistics 10” software system to optimize the resolution of so-called tragedy of the commons, which applies to solve the historical conflict between personal and the public interests as a large group of people are not able to manage common resources [the research analysis of the Nobel laureate Ostrom in the context of finding the optimal solution of the problem in local areas is presented in (Zalizko, 1014)]. As a result, the use of “Statistics” software system allows one to create the optimal strategy for the development of companies and entire sectors or regions under uncertainty and conflict of business interests on the basis of mathematical game theory.

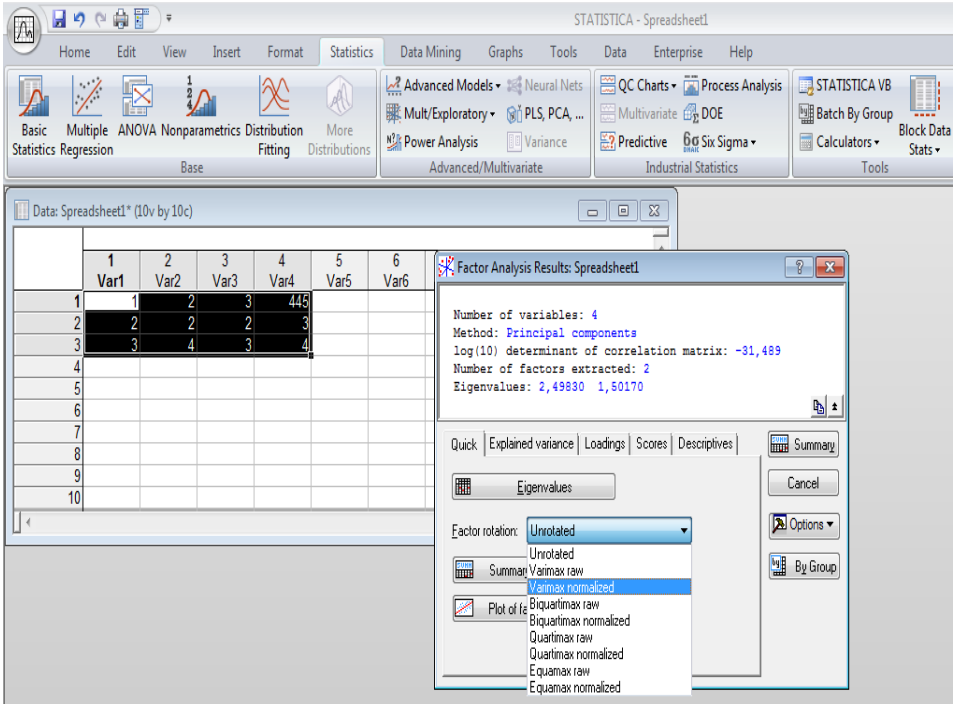

Fig 1. The interface of the software “Statistics 10”

The analogue of open economic system dynamic model is a mathematical game based on the criteria of pessimism or optimism as described by formulas (1) and (2):

$$V_{ij} = \min_i \min_j V_{ij}, \tag{1}$$

$$P_{ij} = \max_i \max_j P_{ij}, \tag{2}$$

where V_{ij}, P_{ij} – are gains matrix and loss matrix, which have *i* rows and *j* columns. In the same manner,, criteria of max minimum and min maximum of gains are set, which are fully described in "Statistics 10". Functionality of this software is so great that it allows one to perform Spearman and Kendall correlation analysis and important forms of normalization of statistic data such asvarimax, quarimax and others (Fig. 1).

Innovative technologies used by the StatSoft Company in the process of development of the mentioned software allow the automation of the complicated process of normalization of index – stimulators by the formula (3):

$$z_i = \frac{x_i}{x_{i,\max}}, i \in N, \tag{3}$$

where z_i — standardized variables of x_i, and $x_{i,\min}$ is the largest non-zero value from a given statistical series. Analogously, we can automate the norm setting of index number disincentive by the formula (4)

$$z_i = \frac{x_{i,\min}}{x_i}, i \in N, x_i \neq 0, \tag{4}$$

where $x_{i,\min}$ – the least values of investigated statistical series.

Another significant advantage of software Statistics 10 over other programs is the harmonious concentration of all necessary economic and statistical functions, a good compatibility with electronic tables, spreadsheets and quality context menu-prompts (help).

The program Statistics is also widely used in many fields of the research estimating the level of economy safety. Specifically, we proposed a scientific approach to the definition of prediction computer model of rural development with elements of factor analysis (Lototska, 2010) and formed a model of modern computer programs used for statistical processing of medical information and biostatic data. Also we proved the feasibility of using modern

information and communication technology as a perspective direction for rural development, which is key to improving the economic security of rural areas (Zalizko, 2013).

Conclusions and recommendations

Under the circumstance of economic globalization, there arises a need for formation of complex strategies for the development of businesses and local areas in general by means of innovative computer technologies, which certainly include the programs of the StatSoft Company.

In our view, the next 10 years will witness the development of innovative technologies, including the ones based on the software system Statistic 10, engaged in complex service of electronic commerce (e-commerce), which will become one of the major types of businesses in the context of development of global network protocols of Electronic Data Interchange (EDI), electronic auctions (e.g. eBay, Asse Trade, Aukro, Free Markets, Trade Out) and other online services, most active in the formation the information society.

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