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PERSPECTIVES USING BPMS-TOOLS FOR ECOLOGICAL COMPETENCES' FORMATION AT THE STUDENTS ECONOMIC SPECIALTIES

Lapyga I.V.

M. P. Dragomanov National Pedagogical University

9, Pirogov, Str., 01601, Kyiv

salpario@bigmir.net

The research results modern approaches perspective to the ecological competencies' formation at the economic specialties students in Poland universities are presented. The revealed advantages of using BPMS-tools for forming practical skills of enterprise management automation in the ecological crisis conditions are suggested to be applied in the training process of training specialists of economic specialties in Ukraine, which will contribute to the world trends' development of "Eco-banking" and "Eco-entrepreneurship".
Key words: FBD, LAD, SPSS Statistics, Bizagi Modeler, Bizagi Studio, Bizagi Engine, Business Process Modeling System, ecological competencies'.

Перспективи використання BPMS-засобів для формування екологічних компетенцій у студентів економічних спеціальностей. Лапига І.В. Наведено результати дослідження сучасних перспективних підходів формування екологічних компетенцій у студентів економічних спеціальностей в університетах Польщі. Виявлені переваги застосування BPMS-засобів для формування практичних навичок автоматизації керування підприємством в умовах екологічної кризи запропоновано застосовувати в навчальному процесі підготовки фахівців економічних спеціальностей в Україні, що сприятиме розвитку світових тенденцій «Екобанкінгу» та «Еко-підприємництва». *Ключові слова:* FBD, LAD, SPSS Statistics, Bizagi Modeler, Bizagi Studio, Bizagi Engine, системи моделювання бізнес процесів, екологічні компетенції.

Перспективы использования BPMS-средств для формирования экологических компетенций у студентов экономических специальностей. Лапыга И.В. Приведены результаты исследования современных перспективных подходов формирования экологических компетенций у студентов экономических специальностей в университетах Польши. Выявленные преимущества применения BPMS-средств для формирования практических навыков автоматизации управления предприятием в условиях экологического кризиса предложено применять в учебном процессе подготовки специалистов экономических специальностей в Украине, что будет способствовать развитию мировых тенденций «Эко-банкинга» и «Эко-предпринимательства». *Ключевые слова:* FBD, LAD, SPSS Statistics, Bizagi Modeler, Bizagi Studio, Bizagi Engine, системы моделирования бизнес процессов, экологические компетенции.

Problem statement. At the preparing future specialists of economic specialties in Ukraine, insufficient attention is paid to the ecological competencies formation and skills of enterprise management automation, business processes, aimed at improving the ecological environment state. In the conditions of the Ukrainian economy integration into the EU countries economic space, this can lead to low competitiveness of Ukrainian specialists economic in the European work market, which is confirmed by the low percentage of their participation in international economic grants and projects, which are directed on the production ecologization.

Research relevance lies in the disclosure of the European educational experience of training specialists' advantages economical specialties with the use BPMS-tools of enterprise management automation, the formation their eco-oriented professional competencies.

Relation of author's rework with important scientific and practical tasks.

In the conditions modern integration of Ukrainian economy into the economic EU space, increased has need in economic specialties specialists with deep ecological knowledge for the long-term and prospective development programs implementation of "Eco-banking" and "Eco-entrepreneurship". Using of positive European experience for training economic specialties specialists in higher Ukraine educational institutions will facilitate the implementation state concept of national ecological policy for the period to 2020. In particular, it will ensure the preparation specialists to economic specialties, capable solving problems of ecologization the Ukrainian economy by applying the latest automation means of enterprise management with the involvement of the Kyoto Protocol mechanisms to the UN Framework Convention on Climate Change [1].

Analysis of recent research and publications. Higher education in the EU countries, for exemplified by Poland, is characterized by high efficiency and success in organizing the learning process, which are achieved through the computer-based learning tools introduction. In scientific works, devoted to the reason's disclosure success of the higher education development in Poland, the authors [2; 3] emphases on modernized legislative provisions on education, as well on pedagogical features using of the information communication technologies methods by teachers for visualize complex information and facilitating formation of knowledge by many disciplines. In Germany, cause success and perspectives higher education, it is believed, is its sociologization tendency [4; 5].

Wherein, features of computer specialized application software that students master during the educational process and whish are used to solve the problems of professional activities of the ecological and economic direction remain insufficiently disclosed. In the universities of Poland, the specialists training by economic specialties, the development they have of practical skills of working with professional computerized programs is carried out in compliance with the high requirements level. This is due to the fact, that upon the training completion, graduates should be ready to introduce in the workplace new computerized technologies and thereby enhance the enterprises competitiveness and efficiency in the European economic area, reduce their dependence on traditional energy sources.

Taking into account the above, the purpose of there is article to reveal the functional features of computer BPMS-tools used in EU countries universities for the professional ecological competencies formation at the economic specialties specialists training.

Researches originality is to disclosure of current higher economic education trends EU countries and the experience of applying the modern approaches to the specialists' formation with professional competencies in the automation by enterprise management at the ecological crisis conditions and planetary climate change global.

Methodological or general scientific value. Methodological or general scientific value consists of disclosing ways to improve of Ukraine economic higher education, directing activities future economical specialties specialists to using latest automate means of modeling, design, control and enterprises management in improve their profitability and improve the environment ecological state.

Statement of the main material. In modern development conditions of industrial and agrarian complexes, enterprise management is mainly aimed at obtaining economic profits for ensuring competitiveness and development. Trying to minimize costs, for a long time the in management of the enterprise did not pay enough attention to ecological problems, which led to an increase in the relevance of many ecological problems.

It became obvious that most effectively they solve can specialists not only with deep economic, but and ecological knowledge. In this regard, in higher education institutions of EU countries, at the training of specialists of economic specialties, considerable attention is paid to the formation of environmentally oriented practical skills of computerized systems use for management enterprise automation.

In the Polish universities educational process, the of the greatest amount auditory time is allotted to mastering the skills working with the "FBD" (Function Block Diagram), "LAD" (Ladder Learning Diagram), "SPSS" Statistics, Bizagi Modeler, "Bizagi Studio" and "Bizagi Engine", at the same time, in the Ukraine universities, the study time majority is planned for the students independent work, which leads to a low training students efficiency and the specialists' formation not competitive in the EU countries economic space.

In the EU countries, in particular in Poland, the specialists training of economic specialties at the bachelor's and master's level provides of the need to take studying disciplines, mainly the economic-ecological and engineering directions, for which the study hours' majority are allocated. This is due to the fact, that EU countries are actively implementing environmental projects in industry and households, increasing the alternative energy sources use (in particular, automatic solar and wind energy systems). In these conditions, has increased the need in specialists of economic specialties with deep ecological and engineering knowledge, which are able not only to implement automatic control systems for enterprises, but also to design energy-saving systems and program their component technical facilities. To solve this problem, in economic universities use programs educational in which provide for forming develop practical skills of working in computer environments of programming technical means used in alternative energy sources (for example, solar panels), in Smart House systems and others. Examples of such graphical programming environments are "FBD" (Function Block Diagram) and "LAD" (Ladder learning Diagram) (Fig. 1). They are used to creating software for logic microcontrollers, which are structural component of automatization alternatives energy sources system.

In addition, in students of economical specialties at practical classes are formed skills to work with computer and software tools of environmental monitoring. For example, to monitor the enterprise activities, its influence at succession of plants, are carried monitoring of condition photosynthetic apparatus by the tools "HandyPEA" [6] device (England), which is contributes to the formation of the skills of using the computer software "WinControl", by which it is staffed. "HandyPEA" provides convenient tools for a comparative and in-depth analysis of the data under study, provides their recording in the memory of a fluorimeter.

In the software, several methods of calculating data can be included to visualize even insignificant differ-

ences in significations of plant chlorophyll fluorescence, which may indicate the presence of plant stress factors in the environment. The device English interface and the applied computer program motivate students to learn English more deeply, which further enhances their professional competencies. In order to improve the analysis accuracy of statistical data, obtained as a result of
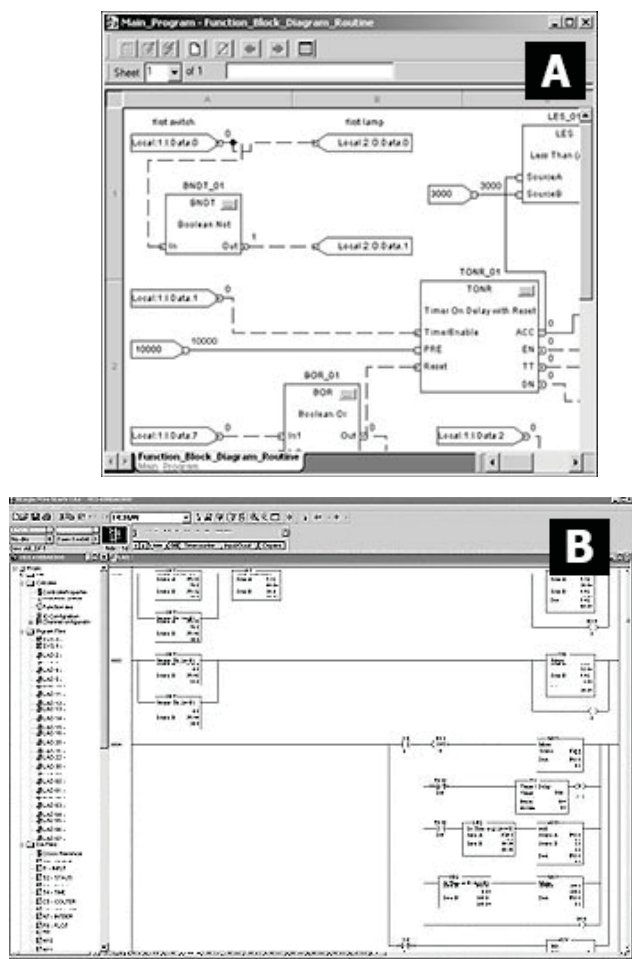

Fig. 1. Appearance main windows of graphical programming environments: A) Function Block Diagram (FBD) [7] and B) Ladder learning Diagram (LAD) [8]
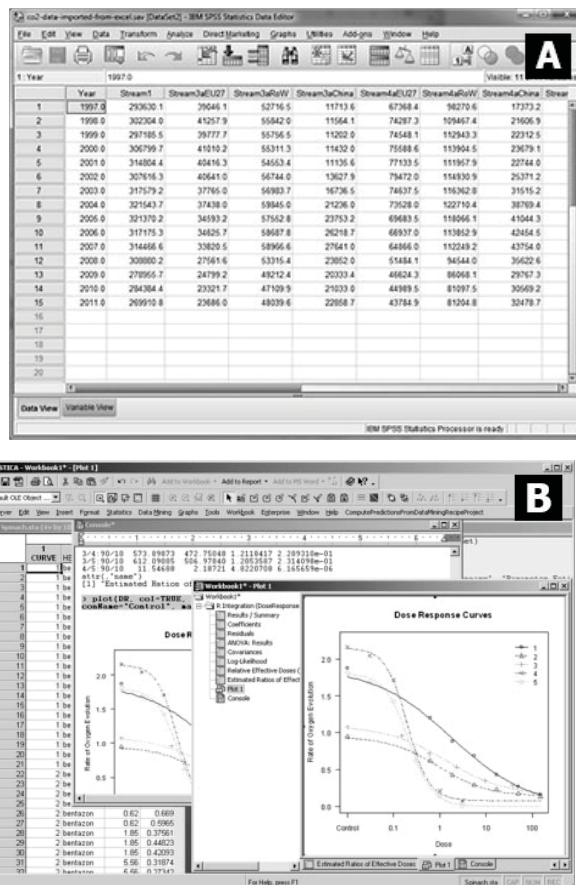

Fig. 2. Appearance to windows of processing statistical data in computer applications: A) SPSS [9] and B) Statistica [10]
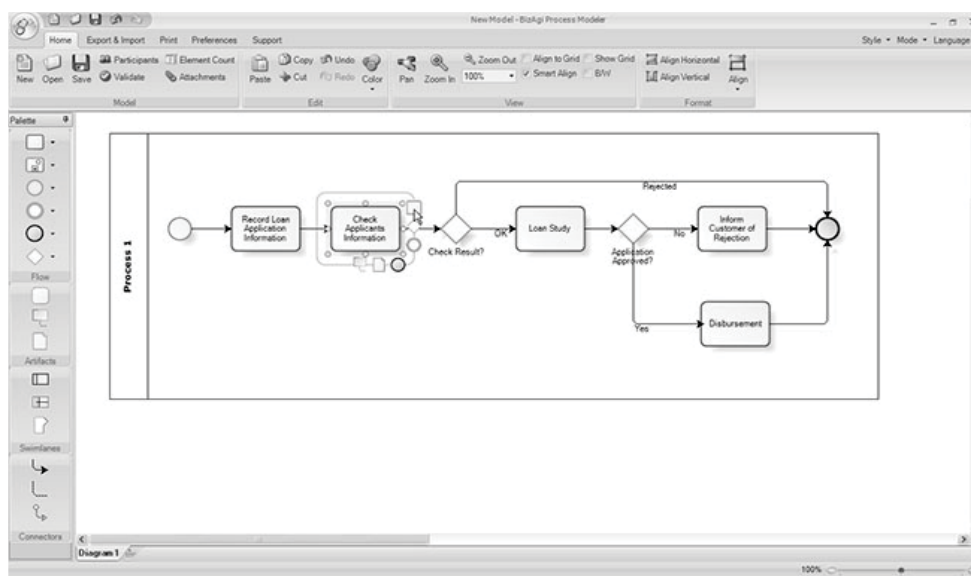

Fig. 3. Appearance to software environment window: "Bizagi Modeler" [11] of business process management automation

environmental monitoring and scientific experiments, at students are forming practical skills in working with computer programs "SPSS Statistics" and "Statistica" (Fig. 2).

These programs provide convenient tools for automating the calculation of not only average indicators, correlation and regression analysis, but also forecasting.

Formation of modern professional competencies in enterprise management automation involves mastering the skills of working with business process management systems BPMS, among which "BizAgi BPM Suite" is the most widespread and powerful. Within the framework of this system, the programs "Bizagi Modeler" (Fig. 3), "Bizagi Studio" and "Bizagi Engine" are functionally integrated.

The program "Bizagi Modeler" is used for graphic modeling automation, analysis, optimization and regulation of business processes. The program "Bizagi Studio" provides convenient tools for converting the created model into program performing addition a software application of automatization business process management, such as "BPMN-modeler", "Database logical scheme designer" (entity-relations diagram), "Web-forms process steps designer", "Business rules editor", "Organization structure editor". "Bizagi Engine" provides execution of the processes created by "Bizagi Studio" and provides users with mobile access to data on specialized Web-portals.

Increase of the use specialized computer programs intensity in scientific and economic professional activities of the EU countries, led to an increase in the demand for highly skilled competitive specialists with formed practical skills in the professional use of applied computer programs. The legislative basis modernization of higher education, for example in Poland, has granted private universities more independence in the creation and curricula implementation and the organization of learning process, increased their flexibility in responding to the needs development of science and industry.

Conclusions. In the conditions environmental crisis growing, at the specialists training of economic specialties, in addition to economics knowledge in EU universities, much attention is paid to the formation of environmentally-oriented, engineering practical working skills with specialized computer programs that are used for influence control of enterprises on the environment. Formation of the economic direction competences involves gaining students the computer simulation skills and abilities, optimization and automation of business processes management using BPMS tools, aimed at improving the environment ecological state.

Orientation of higher education to the highly qualified specialists training, necessary for the enterprises' development in the EU, contributed to the increase in the investment income volume in economic universities, made education more accessible and attractive for entrants also from other countries.

Prospects of using research results. We believe that the experience of developing and reforming higher education in the EU countries can be useful in the modern strategy's development for the higher education development in Ukraine. Increasing attention to the engineering and environmental knowledge formation in the preparation of economic specialties students will contribute to further accelerate the economy reform Ukraine, the success of the "Eco-banking" and "Eco-enterprises" development on the integration path into the EU countries economic space.

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