Information Technologies in Training of Green Business Managers

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Abstract. Implementation of the principles of sustainable development, ecologization of the economy, environmental modernization of production and reduction of anthropogenic impact on the environment largely depend on the provision of qualified, economically and environmentally competent, conscious management personnel. To train these professionals, it is necessary to introduce in the educational process innovative methods and information systems, primarily, in teaching disciplines of interdisciplinary environmental and economics profile (ecological management, environmental entrepreneurship, modern green business technologies, strategy of green development enterprise, ecological economy, ecological accounting etc.).

The article explores the problem of improving the educational process for the training of qualified professionals - environmental managers - by introducing into the curriculum information technologies based on national and international experiences. It substantiates the urgency of the formation of practical skills of using informational technologies for students of the ecological-economic profile so that they are able to quickly navigate in the information space and develop solutions for relevant ecological and economic problems.

The article defines competences necessary for professional realization of future environmental managers in the conditions of ever-increasing growth of information technologies. The article also identifies the structural elements of the most commonly used computer software programs (1C: Enterprise, SAP, M.e.doc) needed for the formation of professional skills of green business managers and suggests methods for their effective teaching

A business simulator “Strategy of “green” business” used for training green managers is proposed. Business simulator have developed by Ukrainian-German Department of Environmental Management and Entrepreneurship of Taras Shevchenko National University of Kyiv together with the German Society for International Cooperation (GIZ). The application of this business simulator involves acquiring theoretical knowledge and practical skills in valuation, accounting, analysis and audit of the environmental aspects of the enterprise, analysis of its environment, modeling the green operations and developing corporate strategy.

Keywords: Green Development, Higher Education, Information Technologies.

1 Introduction

The implementation of the principles of sustainable development in politics, economics, and entrepreneurship requires the preparation of a new category of professionals – competent green business managers. They have to possess profound interdisciplinary knowledge and skills in entrepreneurship, trade, ecology, environmental management, environmental marketing, environmental economics, accounting and auditing, modern green business technologies, etc.

The modern generation of students of higher education institutions is represented, by the so-called, generation Z, the digital people, who from the early age actively use various gadgets, effortlessly navigate the Internet, communicate and receive information through social networks and messaging services. A large selection of information sources contributes to the formation of skills in young people for rapid perception and processing of data. Comprehensive informatization of social life, its virtualization, robotization, and the active development of the digital economy are the impetus for the emergence of new requirements to the organization of educational programs, their level and quality, and the professional competences students expect to obtain during their studies.

Considering current needs of the labor market, social production, global trends in the development of science and education, psychological and personality traits of students, and urgent requirements of the time, in particular, in the training of managers of green business, is the introduction of specialized information and computer technology. This will optimize the learning process and increase its efficiency, foster the interest of students towards the study, develop their theoretical knowledge and practical skills in managing the company on the principles of sustainable development and addressing the current ecological, economic and societal problems.

The organizational, educational, methodological and technical approaches focusing the information technology training at universities has become subject of research by leading scholars. Problems and perspectives of applying information technologies in the training of specialists in various specialties were thoroughly investigated by F. Bennet, A. Bishop, B. Dalgarno, J. Waycott, G. Kennedy, V. Kharchenko, Y. Kondratenko, J. Kacprzyk, V. Lapinsky, A. Pylypchuk [1-4].

The results of scientific studies and practical activities of researchers, economists, IT-technologists, engineers are being introduced in the educational process for the purpose of its informatization. Thus, Y.V. Strelnikov and I.G.Britschenko thoroughly investigated the organizational, technological and psychological aspects of applying modern teaching technologies at universities in the context of the Bologna Process. The authors emphasize that the pedagogical purpose of using information technology education is, first of all, the development of the students' personality, preparation for independent productive activity in the conditions of the information society. It involves intellectual and creative development, expansion of communicative abilities on the basis of joint projects implementation; professional development [5]. O.M. Torubara analyzed the peculiarities of the use of new information technologies in the study of students at universities [6].

Also, there is a group of researchers who investigate the features of information technologies and computer training facilities. S. Kinash, D. Knight and M. McLean study the effectiveness of using on-line lectures in the learning process [7]. O.O. Stechkevich and T.D. Yakimovich analyze the peculiarities of the use of audiovisual training means in the professional education [8].

A number of scholars study the peculiarities of the use of information technologies in the training of specialists in specific fields. In particular, L. Tutun and O.M. Soya reveal the main methodological approaches and analyze the practical experience of forming the competences of future professional teachers of the physical and mathematical specialties and the role of applied programs in the study of mathematical disciplines in higher education [9].

Yet, the problems of informatization of the educational process of training professionals in the field of green business, environmental business and management are currently not sufficiently explored.

Taking into account the above, the purpose of the article is to develop proposals for improving the educational process for the training of managers of green business through the introduction of information technologies using national and international experience.

2 Results of Investigation

The development of the digital economy stimulates the demand for professionals in different specialties that have the specific knowledge and skills in the field of information technologies (IT). Over the last decade, educational institutions have been the main source for developing practical skills in using specialized software. According to the results of one-time surveys of Eurostat (2007, 2011), the share of the population who received practical skills in working with information technologies in educational institutions, increased from 23% in 2007 to 30% in 2011, or by 7 percentage points. The leaders in the growth of the share of specialists who have mastered practical skills of using information technology in the professional sector are Britain and France with 14 percentage points and the Netherlands with 11 percentage points. If the current trends are maintained, one can predict similar indicators for 2020 (Table 1).

Table 1. Share of people who have acquired IT skills in educational institutions, specialized courses, 2007, 2011, %

	Individuals who have obtained IT skills through formalized educational institutes (schools, colleges, university)			Individuals who have obtained IT skills through training courses and adult educational centers		
	2007	2011	2020	2007	2011	2020
European Union, all	23	30	44	11	14	20
Great Britain	26	40	68	9	12	18

Estonia	32	38	50	10	15	25
France	23	37	65	9	4	-
Latvia	29	34	44	10	13	19
Austria	27	33	45	15	17	21
Poland	26	32	37	6	6	6
Netherlands	16	27	49	8	7	5

It is established that at universities for the training of specialists in green business traditionally the information technologies are used in the following main directions:

1. Formation of skills of using technologies for the collection, storage and processing of information and data, their visualization (computers, laptops, interactive whiteboards, etc.).

2. Formation of skills of working with existing market specialized software solutions.

3. Use of specialized training software to acquire students with specific professional skills, taking into account the necessary competences (Figure 1).

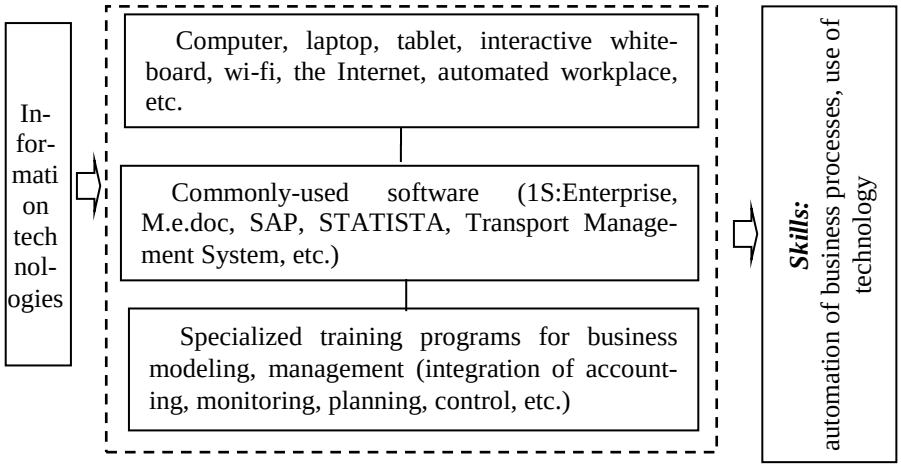

Fig. 1. Using the information technologies in higher education for training green business managers

Taking into account the high level of students' use of modern gadgets and computer equipment, specifically among the generation Z students, the use of standard programs and specialized training programs to master the managerial skills of future professionals in green business is especially relevant.

The analysis of curriculum and education process planning at the leading higher educational institutions in Ukraine, Kazakhstan, Georgia, Uzbekistan, and Moldova reveals that in the preparation of managers of green business the most frequently used information software is designed to automate certain areas of business activity, e.g. bookkeeping, production management, automation of procurement and supply chain

management, stock flow management, sales, and logistics. This software includes, in particular, 1C: Enterprise, SAP, Me.doc, Transport Management System, etc. Hence, the mastery of the structural units of these programs is necessary for the formation of professional skills for environmental managers for the organization of production and management of the enterprise as a whole (Table 2).

Table 2. Structural units of common software for the preparation of green business managers for enterprise management and organization of business processes

Software	Main structural units
1S:Enterprise	Primary documentation and paper flow management Analytical accounting Operational reporting, financial reporting
SAP	Management of production, supplies, stocks and sales Personnel management Project management
Me.doc, SOTA	Information requests to regulatory authorities Statistical reporting Tax reporting
Transport Management System, Logist.ua	Incoming requests management Route optimization Reporting

However, the findings of previous studies conducted by the authors of this article with regard to enterprises that have incorporated the principles of corporate social responsibility demonstrate that mastery of this common software for the managers of green business is not sufficient. This is due to the following factors:

1. At an enterprise, green business managers, in addition to their generic managerial responsibilities, also perform a range of specific functions, e.g. organization of the environmental management system, substantiation of the green development strategy, environmental assessment of projects, etc. In the conditions of the changeability of the environment, pressing environmental problems and the rapid development of information technology, the implementation of such functions requires from green business professionals deep interdisciplinary knowledge and skills in the formation of specific analytical data and methods for their systematization and processing.

2. Commonly-used software is designed to automate the specific information management needs. Thus, 1C:Enterprise is intended for the formation of data on business processes and their documentation support. Transport Management System is used to optimize logistics. However, the weakness of these and other typical software is their limited functionality for the automation of environmental activities, which hinders the economic and environmental analysis of economic activity and the formation of statistical information of enterprises.

3. Common software has different interfaces. It takes extra time to build students' skills for the effective use of different software.

As Y.V. Strelnikov and I.G.Britschenko suggest "An important role in the process of creating and using information technology belongs to the system of higher educa-

tion as the main source of highly qualified personnel and a powerful base for fundamental and applied research. The specificity of higher education lies in the fact that it is, on the one hand, a consumer, and on the other hand - an active producer of information technologies" [5].

Taking into account the above mentioned challenges, we believe that the curricular-organizational model of using information technologies in the training of green business professionals in higher education should be based on the following components: defining generic and professional competences that managers need for ensuring effective green management, development and approbation of curriculum for specialized training programs, and the development of software for the assessment of acquired skills and knowledge (Figure 2).

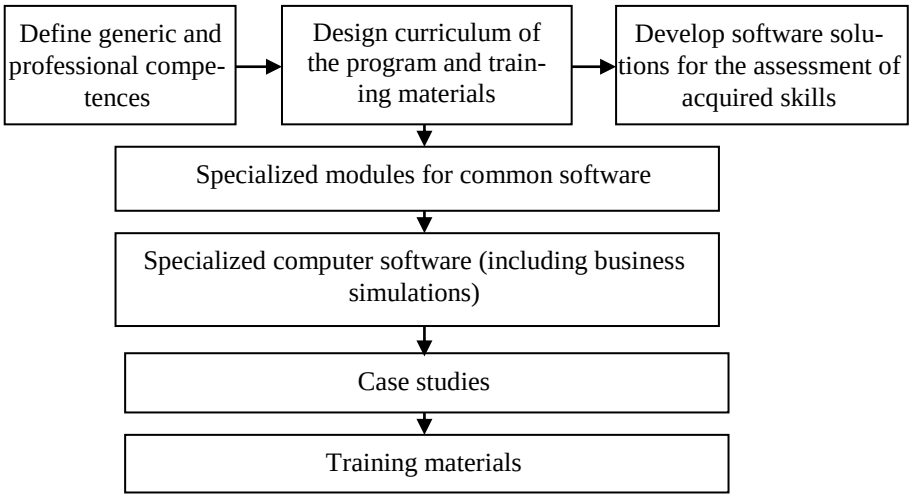

Fig. 2. Curricular-organizational model of using information technologies in training green business professionals.

Defining generic and professional competences

Taking into account the complexity and the multilateral nature of the professional tasks facing environmental managers, we have identified their main competences, skills and abilities in applying specialized information technology:

1. Formation of statistical and analytical database for substantiation of decisions aimed at ecologization of production, reduction of anthropogenic impact, making capital investment in the field of environmental protection.
2. Organization of monitoring of environmental impact of the enterprise, analysis and processing of received data.
3. Informational and analytical support of ecological management system, internal ecological and energy audit.
4. Ensuring the interaction of the enterprise with the supervisory bodies on the matters of environmental protection.
5. Organization of control over the use of energy resources and ensuring overall energy efficiency of the enterprise.

6. Development of strategic goals of green enterprise development, determination of ways of achieving these goals, preparation of operational plans and supervision over their implementation.

Development of curriculum and training materials

These days, higher education institutions all over the world are actively developing their own information software for training managers and other professional's in the field of economics. For instance, University of Regensburg (Germany) uses in the educational process and for writing thesis the software for processing economic data and models for making managerial decisions and assessing the impact of their implementation on operational activities based on large industrial enterprises. It also uses software that allows to work in teams remotely (in different regions, countries).

Dresden Technical University (Germany) uses a training software and a model for assessing the performance of airports. This contributes to the formation of skills for students in the planning of activities, internal document circulation, and control of operational expenses of an airport.

In a number of universities of the Czech Republic who train specialists in sustainable development, they use computer models that allow to compute the impact of environmental and economic indicators on the development of the region.

Karaganda Economic University Kazpotrebsoyuza (Kazakhstan) has implemented a software program called Virtual Trading Enterprise, which allows to predict the economic efficiency of trade, taking into account various combinations of input and output conditions (type of product, sales, marketing costs, profit, profitability, etc.).

In Ukraine, higher education institutions also engage in the development of specialized training programs that allow raising students' awareness of the systematic data in the field of environmental business management and fostering acquisition of skills for data processing and analysis in order to make informed strategic decisions. In order to improve the incorporation of information technologies in the learning process, the authors have investigated the needs and expectations of the future professional in green business management of Taras Shevchenko National University of Kyiv, Ukraine. In the period from 2016 to 2019, we surveyed the students of Environmental Entrepreneurship program specializing in Entrepreneurship, Trade and Stock Exchange (full-time education). There were 88 respondents or 93% of the total number of students. The survey found that students want to deepen practical skills in accumulating, processing and analyzing data (95% of responses). At the same time, they want to use in the process of learning a case study method with data of real operating enterprises and organizations that adhere to the principles of corporate social responsibility (68% of answers). Three quarters of respondents noted the importance of using an integrated, interdisciplinary approach, namely, the inclusion in the calculations, analysis of not only economic but also environmental, social indicators of economic entities. Almost all respondents (96%) preferred interactive teaching methods, in particular, the use of business simulators to develop and select a green enterprise development strategy.

To meet the students' needs, the Ukrainian-German Department of Environmental Management and Entrepreneurship of the Taras Shevchenko National University of Kyiv with the assistance of the German Society for International Cooperation (GIZ)

and the Swiss Foundation for Technical Cooperation for the first time in Ukraine designed a business simulator entitled Strategy of Green Enterprise Development based the 1S:Enterprise 8.3 software for Ukraine. Teachers, experts and practitioners in the field of ecology, business and IT technologies from Ukraine, Germany, and Switzerland were involved in the development of this software.

This business simulator operates on the basis of an acting enterprise - Berezanska Ptakhofabryka, PJSC - and enables students:

1. To collect primary data of the environmental activity of this business (air emissions, costs on environmental protection, costs of producing goods with enhance ecological characteristics, earnings and expenses stemming from environmental activities, capital investment in the environmentally-friendly equipment, etc.), to systematize this data and aggregate it for further use in reports related to environmental management (Figure 3).

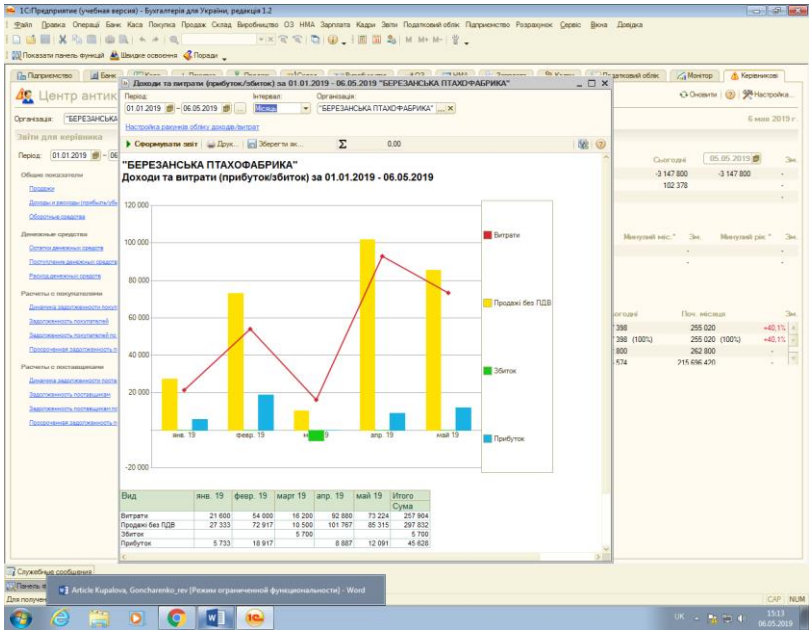

Fig. 3. Report on earnings (expenses) from environmental activity of Berazanska Ptahofabryka, PJSC in 2018, compiled using Strategy of Green Enterprise Development business simulator.

2. To compute environmental and economic indicators of enterprise using primary data (share of organic products in total output of the enterprise, level of energy efficiency, average annual expenses on tangible assets for environmental purposes, amount of environmental fees per 1 UAH of tangible assets for environmental purpose, ratio of recycled waste, etc.).

3. To plan and forecast environmental and economic performance indicators based on alternative scenarios of the company's strategic sustainable development.

Thus, the Planning and Forecasting module of business simulator is aimed at developing the following skills:

1. To optimize the production structure of the poultry enterprise (eggs, poultry) by decreasing the expenses on purchasing the supplies of water and electricity;
2. To assess and forecast the reductions in expenses associated with anthropogenic impact and environmental protection in order to maximize the company's operating profit.

The environmental characteristics under study include water use, water drainage, waste management, air emissions (CO_2, CH_4) and energy use (Figure 4).

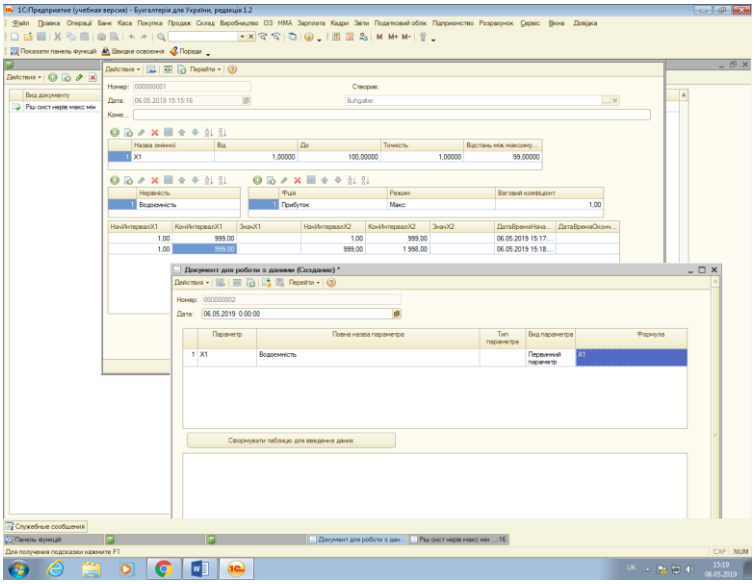

Fig. 4. Interface for Planning and Forecasting module within Strategy for Green Business Development business simulator

Development of software for the assessment of acquired skills

To test the acquired knowledge and skills, business simulator has a Testing module used to generate on-line random online test questions and check responses to them.

3 Conclusions

In the conditions of implementation of the principles of sustainable development, the transition to the digital economy, the informatization of social life and business calls for the preparation of managers in green business with advanced knowledge of information technologies.

Computer facilities, standard management programs and business modeling software should be more widely used in higher education to improve the training of green

business professionals. Students seek to acquire practical skills in collecting primary data, its processing and analysis, and expect to use case studies with data of actually operating enterprises and organizations that adhere to the principles of corporate social responsibility. They wish to learn to analyze not only economic, but also environmental and social indicators of enterprise activity for making managerial decisions.

Computer-based business simulator is an innovative method of training green business managers. Its use in the educational process promotes the formation of students' practical skills in standardization, accounting, analysis and audit of environmental aspects of the enterprise, analysis of its external environment, modeling the strategy of green development. Using data from real operating companies can strengthen the practical training of students, clearly demonstrate business processes, and reduce the time of professional adaptation among young specialists. An interdisciplinary approach used in the development of the suggested business simulator makes it relevant for the training of students in the fields of Entrepreneurship, Trade and Stock Exchange, Economics, Ecology, Accounting and Taxation, Management, and others.

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