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THE MODELLING OF EDUCATION SERVICES AND LABOUR MARKETS FROM MARKETING POSITION

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The methodology of decision preparation was created and implemented. It is based on imitational modeling of cooperation between education and labor markets. The constant increasing of information volume, its dependence on external environment state and internal organization was also included into the methodology. The main aim is increasing of effectiveness of the system of higher education institution management.

Keywords: *higher education, marketing, dynamic imitational modeling, absolvents of higher educational institutions, education market, labor market, applicants for job places, vacancies, payroll level.*

Introduction

Recently, the problem of employment of graduates of many professions aggravated in Ukraine (including economists and lawyers), which requires a holistic socially oriented development strategy for human potential, which takes into account the requirements of jobs to the training of potential workforce.

The task of higher education institutions in the field of training of professionals is to provide labor market with specialists who possess the necessary skills and qualities that meet the requirements of employers. The control system of higher education should provide comply demand arising from potential students as well as employers demand in the labor market. Exactly the relevance of this problem has determined the selection as an object of work higher education institutions (HEIs) and its compliance with the requirements of the labor market.

The issues of management of HEIs at different levels at different time periods iwas developed by many prominent foreign and domestic scientists; for instance, Y.S. Vasiliev [1] V.A. Holovenko [2], A.O. Hrudzynskyy [3], A.A. Jaremenko [1].

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These works mostly belong to research in the field of management of higher education; however, the question of innovation management of HEIs in the modern period of Ukraine's integration into the European educational space remained almost untouched by scientists and researchers.

The basis of creation of management systems of HEIs in modern conditions is the theory of organization developed by Charles Augustus Velhelmoma [4], D. Dirlava [5], V.G. Eliferova, V.V. Repin [6], P.M. Kulikov, J.G. Lysenko [7], V.N. Timokhina [8], an others. The theory could help to define innovative tools, be able to increase the efficiency of administrative processes in the field of education. However, there was given insufficient attention to implementation of quality management system in universities.

Problem setting

To solve the problem of accordance of modern national education system with labor market requirements apply certain marketing concept. That concept comes from the fact that mortgage achieving of the organization's goals is the determination of the needs and requirements of conventional markets. In addition, the provision of the desired satisfaction should be done in more efficient and productive ways than the competitors do. [9].

By marketing educational services the management proposal institution will be meant. It should be oriented to the demands of the labor market, with the formation of active demand for advanced educational services and providing employment trained professionals.

Thus, the concept of marketing is used for two types of markets: the labor market and education market.

In the labor market HEIs have the following tasks: study of the situation on the labor market, in other words, determination of demand for the relevant specialists; definition of requirements to graduates from employers; assessment and forecasting the market trends (structural changes in the economy).

In the education market HEIs deal with: studying the demand for educational services from potential customers; studying the offers of educational services of other universities; definition of price classes; identifying their competitive advantages.

Main purpose of the article

Carrying out mentioned recommendations for the purpose of improving educational organization will help to create and provide consumers (applicants) optimal range of professions, learning forms and methods of payment that fully meet not only the current situation in the country, but demand in the future.

In order to improve management of HEIs, under the conditions of information volume grow, increasing its dependence of the environment state and its internal organization; there should be developed and implemented the methods for the preparation of decisions based on simulation.

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The results of the research

The decision-making process and its applying that takes into account the results of simulation are performed with the help of information. I should be formalized, systematized and passed to the subsystem of management decisions.

The systematic dynamic model of interaction between education market and the labor market was considered. The existence of feedback connections leads to improving of the management system of HEIs based on the concept of marketing.

The assumptions of the model are the following:

1. There are three main types of educational services: professional-technical education [10], higher education in economics and law direction, other higher education [11] (data for the calculation for 2014, excluding the temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and the zone of the antiterrorist operation). In recent years there has been a significant intensification of training specialists of second group in damage to the other two groups.

2. Under certain market structure of educational services, on the labor market there are three main areas of employment.

3. The state does not regulate the market of educational services, but may affect the efficiency of the labor market.

4. The relationship between the availability of jobs for particular categories of workers and the number of applicants applying for these jobs determines wages on the selected segment of the labor market.

5. The connection between value of wages in a particular segment and average salary for the three selected categories of employees determines the prestige of each type of education.

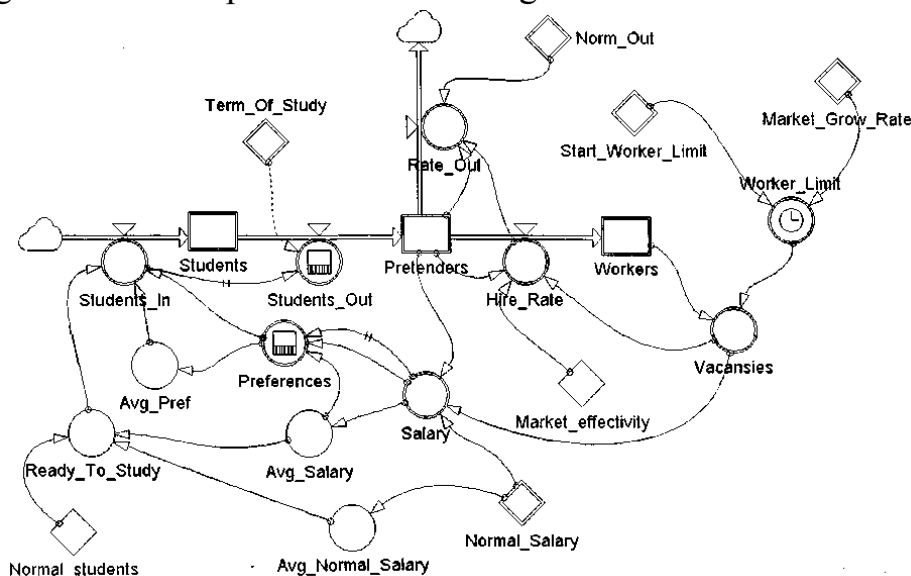The Figure 1 below represents current diagram of the model.

Fig.1. **Representing of dynamic simulation model of interaction between education market and the labor market created in PowerSim**

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Let us consider the various blocks of the model and their relationship.

The part of the model, conventionally designated as "training block" presented in Figure 2 displays the dynamic process of acquiring education of future labor market actors.
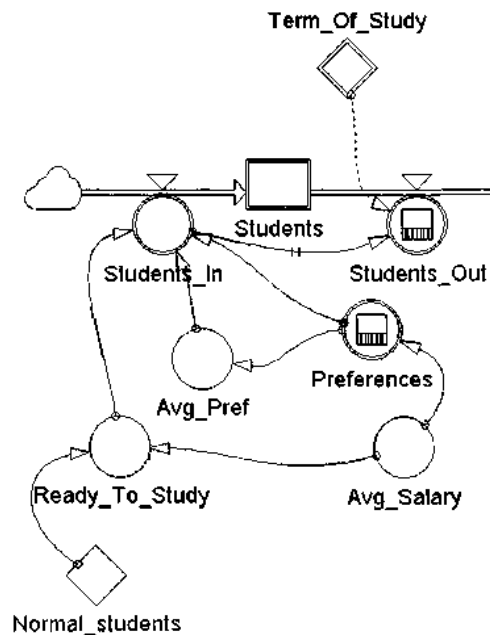

Fig. 2. **The part of current diagram that corresponds to training block**

As it is seen fom Figure 2, the total number of applicants is determined by basic constant *Normal_Students* (the number of entrants in equilibrium state of the market at the beginning of the simulation), and average wages of specialists after getting education *Avg_Salary*.

The distribution of the total number of students on directions of education is dependent on prestige variables Education *Preferences* (prestige of each area of education) and *Avg_Preferences* (average prestige education).

The total number of entrants *Ready_To_Study* and individual preferences *Preferences* determine the number of students who begin studying in each area at a given time *Students_In*. Total number of students who continue their education at the moment, reflected by the integrated variable-level *Students*.

Apprenticeship during years for each of the areas of studying is defined by constants vector *Term_Of_Study*. For selected areas of education this vector was represented by values (3,5,5).

The number of students who finish their studies at the time *Students_Out* is determined by the number of students who began training *Term_Of_Study* few years ago. After graduation, former students are already acting as active participants in the labor market.

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The block model "labor market" considers the behavior of graduates after graduation. Its structure is shown in Figure 3.
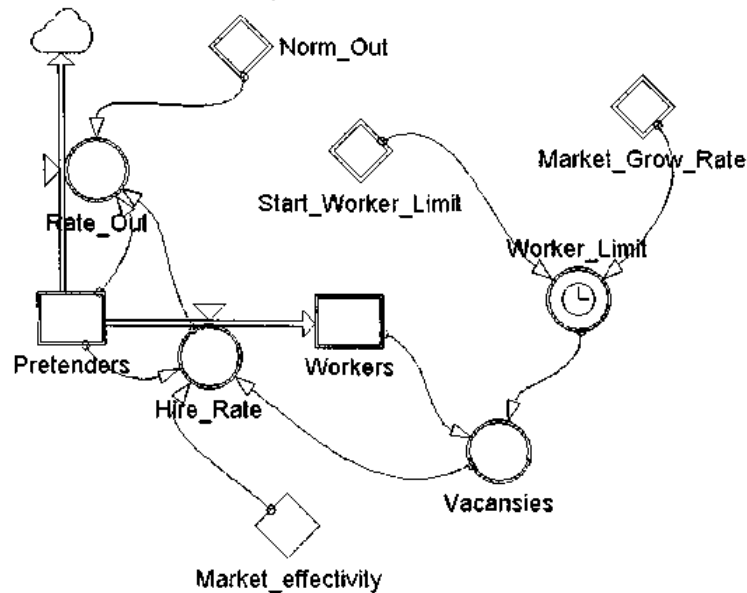

Fig. 3. **The block model, which reflects the functioning of the labor market**

Number of applicants for employment vacancies that exist on the market, is accumulated in the variable-level *Pretendents*.

Number of jobs in each direction is given by the vector *Worker_Limit*, whose value is determined by the initial number of jobs (vector constants *Start_Worker_Limit*) growth and jobs (vector constants *Market_Grow_Rate*) [12].

The difference between variables *Worker_Limit* and *Workers* (numbers of employed workers in each area) specifies the number of vacancies in the market *Vacansies*.

An important role in this block model plays variable *Market_Effectivity*, which reflects the efficiency of the labor market. This variable determines which part of the operations of the hiring will actually concluded. During the testing of the model, it has shown that this variable significantly affects the speed of achieving equilibrium of model. In the real economy, variable *Market_Effecttivity* accumulates the efficiency of labor stocks and public employment institutions.

Number *Pretenders* [13, 14], *Vacansies* and *Market_Effectivity* determine the number of transactions of employees *Hire_Rate*, concluded at the each moment of time. The magnitude of this variable determines the increase of number of employees and increase of the number of applicants and vacancies.

As the mechanism of labor market regulation there was introduced the concept of graduate exit from the market. In most cases, exit from the labor market is temporary [15]: applicant can try to wait until market conditions improve or start to

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study for achieving new skills in order to get more popular specialty. Speed exit differs for the labor market and for different candidates, their levels of education and it is determined by vector constant Norm_Out (percentage of unemployed in each category leaving the labor market during the year).

Movement out of the labor market is an important adaptive mechanism that affects its stability. Testing of the model with low exit velocity showed that in this situation a slight deviation from the equilibrium in the market leads to prolonged stagnation of virtually irreversible effect. The effect in the actual period of time causes the decline in demand for certain categories of professionals, and, as a result, falling wages in this segment of the labor market.

The block of wages and benefits for students formation is a link that ensures the integrity of the model, because it describes the relationship between labor market and education market. The structure of the block is shown in Figure 4.
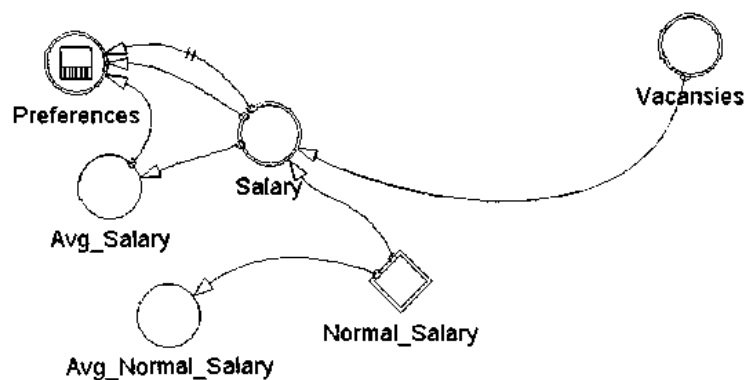

Fig. 4. **The structure of the block of wages and benefits for students**

Wages level *Salary* for each of the segments of the labor market is determined and based on the ratio of the number of vacancies and the number of applicants for these vacancies. Wages level is also affect by its initial equilibrium value *Normal_Salary* [15].

The level of salaries for professionals with different levels of education is an essential factor for students when they are making the choice of direction of studying. This takes into account the inertia of public opinion regarding the benefits of the acquisition of a specialty: the prestige of the direction of education is defined as the ratio of the average wage in a particular direction in the past two years to the current average wage in the whole labor market. Introduction of lag into the model is determining preferences of applicants, increases its realism, and, as it will be shown below, is one of the main causes of oscillatory mode, which the model shows.

The calculation of model was conducted on the basis of Ministry of and Science of Ukraine data and the State Statistics Committee of Ukraine data [16, 17] (discrete simulation is 1 month, simulation period of 5 years respectively).

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Figures 5-7 show the basic indicators of dynamics of the model.
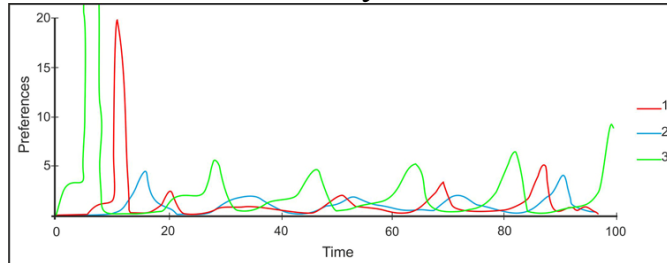

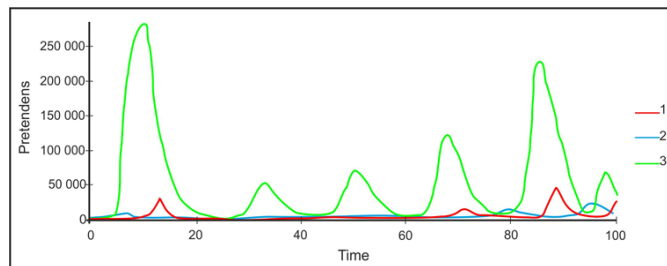Fig. 5. **The dynamics of benefits of applicants**

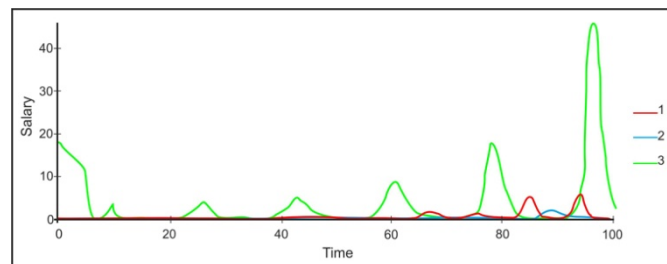Fig. 6. **The dynamics of specialists preparation**

Fig. 7. **The dynamics of salaries level**

As it is seen from Figures 5-7, the model was built on the assumption of the absence of state regulation of educational services, shows a tendency to explosive vibrations even at considerable activity of government on the labor market (while modeling high efficiency of the labor market was considered).

The performance of model is explained, first of all, by imperfect mechanism of decision-making process of applicants, based on the current level of wages and the gap between the moment of the beginning of studying and being a part of the labor market. A similar imbalanced situation was observed in Ukraine: the popularity of economic and law professions in the mid 90s of the last century has caused the surplus of specialists of these fields in the labor market.

Conclusions

Thus, the system of dynamic modeling of education and labor market demonstrates the need to improve the management system of higher education institutions based on the concept of marketing. In addition, one of the areas of

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improvement must necessarily be forecasting of the dynamics of the labor market and appropriate adjustments of recruitment plans created by schools.

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МОДЕЛЮВАННЯ РИНКУ ОСВІТНІХ ПОСЛУГ І РИНКУ ПРАЦІ З ПОЗИЦІЇ МАРКЕТИНГУ

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Завданням вищих навчальних закладів в галузі підготовки фахівців є надання ринку праці фахівців, що володіють необхідними навиками і якостями, які відповідають вимогам працедавців. Система управління вищого навчального закладу повинна забезпечувати приведення у відповідність попиту, що виникає з боку потенційних абітурієнтів, і попиту роботодавців на ринку праці.

З метою підвищення ефективності системи управління ВНЗ, в умовах постійного наростаючого збільшення об'ємів інформації, посилення її залежності від стану зовнішнього середовища і її внутрішньої організації, необхідно розробити і впровадити методи підготовки рішень на основі імітаційного моделювання.

У роботі розроблено системодинамічна імітаційна модель взаємодії ринку освіти і ринку праці, яка завдяки наявності зворотного зв'язку приводить до вдосконалення системи управління вищого навчального закладу на основі концепції маркетингу.

Загальна потокова діаграма моделі включає три блоки. Частина моделі позначена як "блок навчання" відображає динаміку процесу здобування освіти майбутніми суб'єктами ринку праці.

Блок моделі «ринок праці» розглядає поведінку випускників після завершення навчання.

Блок формування заробітної плати і переваг абітурієнтів є ланкою, що забезпечує цілісність даної моделі, оскільки саме в його рамках описуються взаємозв'язок між ринком робочої сили і ринком освітніх послуг.

Розрахунок моделі проводився на підставі даних сайтів Міністерства освіти і науки України і Держкомстату України.

Отримані, результати системно-динамічного моделювання ринку освітніх послуг і ринку праці наочно демонструють необхідність вдосконалення системи управління вищого навчального закладу на основі концепції маркетингу. При цьому одним з напрямів цього вдосконалення повинні бути прогнозування динаміки ринку праці і відповідне корегування

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планів набору навчальних закладів.

Ключові слова: вища освіта, маркетинг, імітаційне динамічне моделювання, випускники навчального закладу, ринок освіти, ринок праці, претенденти на робочі місця, вакансій, рівень заробітної плати.

МОДЕЛИРОВАНИЕ РЫНКА УСЛУГ ОБРАЗОВАНИЯ И РЫНКА ТРУДА С ПОЗИЦИИ МАРКЕТИНГА

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Задачей высших учебных заведений в области подготовки специалистов является предоставление на рынке труда специалистов, обладающих необходимыми навыками и качествами, которые соответствуют требованиям работодателей. Система управления высшего учебного заведения должна обеспечивать приведение в соответствие спроса возникающего со стороны потенциальных абитуриентов и спроса работодателей на рынке труда.

С целью повышения эффективности системы управления вузом, в условиях постоянного нарастающего увеличения объемов информации, усиление ее зависимости от состояния внешней среды и ее внутренней организации, необходимо разработать и внедрить методы подготовки решений на основе имитационного моделирования.

В работе разработана системодинамичная имитационная модель взаимодействия рынка образования и рынка труда, что благодаря наличию обратной связи, приводит к совершенствованию системы управления высшего учебного заведения на основе концепции маркетинга.

Общая поточная диаграмма модели включает три блока. Часть модели обозначена как "блок обучения" отражает динамику процесса получения образования будущими субъектами рынка труда.

Блок модели «рынок труда» рассматривает поведение выпускников после завершения обучения.

Блок формирования заработной платы и преимуществ абитуриентов представлен звеном, обеспечивающим целостность данной модели, поскольку именно в его рамках описываются взаимосвязь между рынком рабочей силы и рынком образовательных услуг.

Расчет модели проводился на основании данных сайтов Министерства образования и науки Украины и Госкомстата Украины.

Полученные, результаты системно-динамического моделирования рынка образовательных услуг и рынка труда, наглядно демонстрируют необходимость совершенствования системы управления высшим учебным заведением на основе концепции маркетинга. При этом одним из направлений этого совершенствования должны быть прогнозирования динамики рынка труда и соответствующая корректировка планов набора учебных заведений.

Ключевые слова: высшее образование, маркетинг, имитационное динамическое моделирование, выпускники учебного заведения, рынок образования, рынок труда, претенденты на рабочие места, вакансий, уровень заработной платы.