USE OF INFORMATION TECHNOLOGIES IN TRAINING EXPERTS FOR LATVIAN NATIONAL ECONOMY

Konstantin Didenko, Vitalijs Jurenoks
Technical University – Riga, Latvia

ABSTRACT

In order to meet the goals laid down in the national economic policy, the new labour market requires an education and policy that would ensure optimal utilization of human resources, thus creating a productive base for the country's economic growth. The system of studies at Riga Technical University is developed so that it could train specialists required by the Latvian national economy, which would be capable and competent to understand the goals of solving existing problems, as well as would be able to professionally participate in the management and development of implementation of projects dealing with solution of problems.

The research focuses on the possibility of using up-to-date information technologies in organization and implementation of projects.

One of management control instruments of business performance of enterprises is evaluation of its effectiveness. Traditional methods of evaluation of effectiveness of business performance of enterprises in fact are already outdated and are not at all oriented to the future. The authors suggest the use of up-to-date methods, including simulation modelling.

The professional bachelor programme provided by the Chair of Economy of Production and Entrepreneurship of the Faculty of Engineering Economics of Riga Technical University is aimed at training specialists for the economy of the Republic of Latvia.

The goal set by the professional bachelor programme is to train economists competent:

- to perform economy-related work assignments;
- to analyse performance results both at the microeconomic and macroeconomic level;
- to identify the problem;
- to make forecasts with regard to most optimum methods of attaining the targets set;
- to plan and implement the planned targets.

The graduates of professional studies are equipped with relevant knowledge in microeconomics, macroeconomics, economic forecasting, economic analysis and planning, economics of entrepreneurship, finances, accounting, marketing, information technologies, management sciences, quality management, methodology of doing research, as well as are offered a possibility to master the required command of foreign languages to be used in daily business-related professional environment.

The graduates should have practical working skills, which are acquired during studies, as well as should be able to apply the knowledge gained during practical placement when elaborating academic papers, projects, and the diploma project.

The graduates have to be capable of understanding the goal, when addressing the problem, and have to professionally participate in the elaboration and management of implementation of the project.

The number of graduates of the professional RTU FEE CEPE bachelor programme "Entrepreneurship and management" (for the period from 2003 – 2005) is presented in fig. 1.
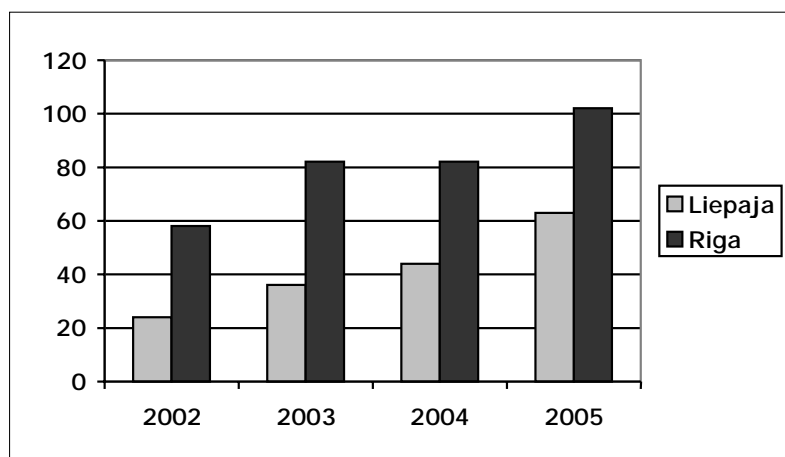

Figure 1. Number of graduates of the RTU FEE CEPE professional bachelor programme "Entrepreneurship and management"

The statistics presented in fig. 1 show an annual growth trend in the number of professional bachelors trained within the framework of the programme. In 2005, 165 professional bachelors graduated the programme.

The themes of the diploma papers cover a wide scope of business areas, including optimisation of production costs, evaluation of performance results of enterprises, the system of business risks, new technologies and economic effectiveness aspects of technology, insurance development prospects, ecology issues etc.

All diploma papers have addressed topical problems, contain novelty elements and are of practical relevance.

The areas most extensively investigated in the diploma projects are:

- improvement of planning of production enterprises;
- enhancement of competitiveness of enterprises;
- projects of reduction of costs of production enterprises;
- enhancement of effectiveness of the performance of enterprises.

The number of defended engineering and diploma projects is presented in table 1.

Table 1. The number of defended engineering and diploma projects by years

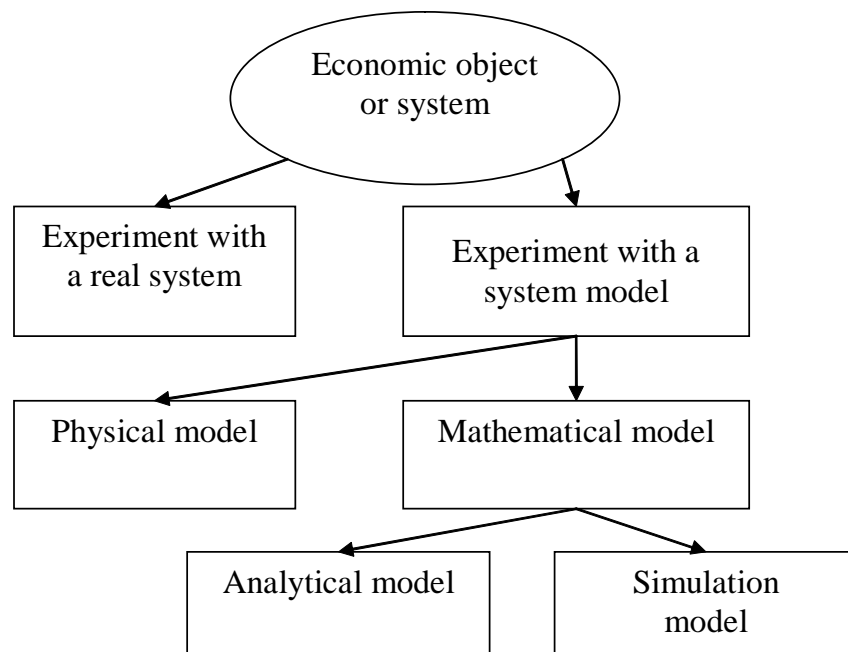| Specialities	2002	2003	2004	2005
Informatics and modelling in entrepreneurship	9	7	5	16
Economics of entrepreneurship	19	11	114	143
Financial analysis	9	12	7	5
Marketing and trade	21			
Economics, accounting and taxation	24	53		
Marketing and economics of trade		35		
Total:	82	118	126	165

Figure. 2. Research methods investigating economic objects and systems, and the scheme

Fig. 2 presents the research methods applied in research of economic objects and systems, and the scheme of selection of methods.

The focus on these problems is explained by the fact that, presently, each enterprise faces different conditions, which affect the decision-making process, therefore these are relevant factors that must be taken into account.

A problem is known to be an issue requiring for a solution. Therefore, classification of problems is frequently based on the principles of classification of solutions, according to which problems are divided into groups considering:

- the degree of complexity;
- level of application;
- level of management.

According to the level of complexity, problems may be subdivided into three subgroups:

- general problems;
- specific problems;
- local problems.

General problems are dealt with in completed projects and their results, e.g., a report on the research work, production development project, business plan, sets of operational planning documentation etc., projects and sets of project documentation. General problems are to a great extent connected with engineering. Solution of these problems involves engineers, economists, managers, as well as other specialists.

Specific problems are part of general problems. This subgroup of problems includes specific production, technological, organizational and other tasks, which are dealt within in the course of production process (i.e., selection of machinery and tools to be used, selection of materials and parts, selection of parameters of a technological process and other tasks).

Local problems consist of several specific problems. Due to this, local problems should not necessarily be completed. The results obtained when dealing with local problems help to resolve general problems.

When considering the possibilities of resolving specific economic problems, it is necessary to take into account the fact that these problems are inseparably connected with a definite economic system or process. Therefore, the solution of a particular problem should commence with the investigation of the particular economic system or process the specific problem is connected with.

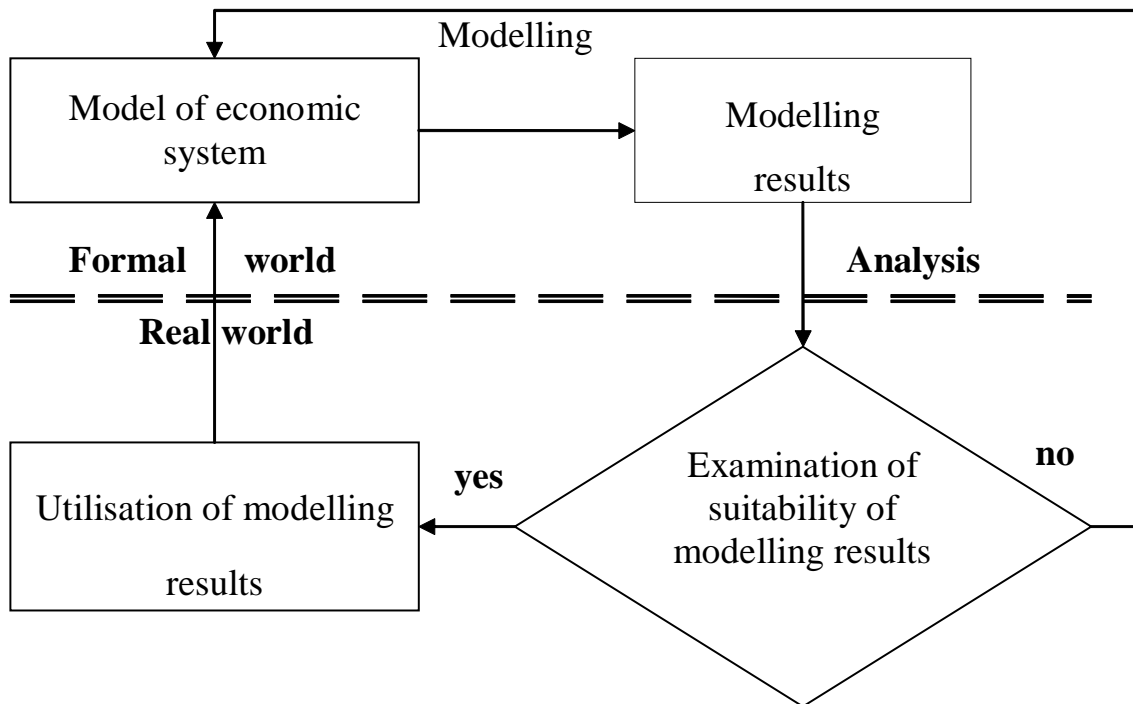The process of modelling economic systems is presented in figure 3.

Figure 3. General scheme of modelling processes of economic systems.

Most frequently the objects (systems) investigated in diploma projects present complex economic systems which are impossible to accurately represent in the form of analytical models, or it is simply not profitable to do from financial considerations.

In such cases simulation modelling is used, as a result of which the changes of specific parameters (characteristics) of the object, which is being investigated, are simulated.

The purpose of simulation modelling is to create an environment or a model that would allow, by means of experimenting, to obtain necessary information about the investigated object, based on the investigation of the model or environment created.

The basic idea of simulation modelling is creation of a mock-up of the object or system being investigated, i.e. creation of the so-called "simulation", which reflects the basic characteristics of the object and/or the system under investigation as well as the regularities in the changes of these parameters in space and time.

Simulation modelling envisages the use of quantitative (numerical) parameters, thus all parameters, as well as interaction of parameters have to be expressed numerically.

Generally, the model in this stage may look as a "black box" (see fig. 4).

Figure 4. Economic system model as a "black box"

The necessity to use simulation modelling arises in cases when direct experiments with the object under investigation are not possible, due to their complexity or inaccessibility, or in the cases when direct experiments with the object of investigation are not justified due to their high costs.

Application of information technologies in the research of economic systems is demonstrated in fig.5.
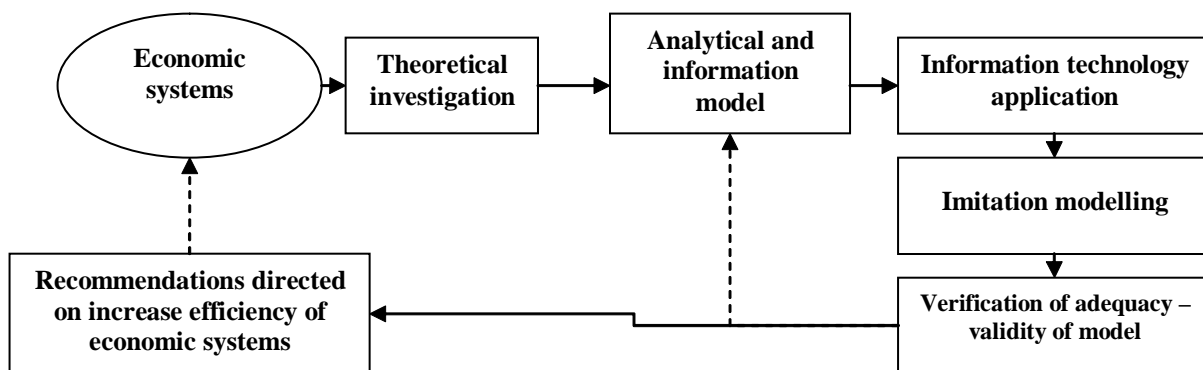
Figure 5. Application of information technologies in research of economic systems.

In order to enhance the effectiveness of operation of any economic system it is necessary:

- to study and disclose the regularities of functioning of the process (system) being investigated;

- to mathematically describe the regularities of functioning of the respective process (system) in time;

- to model, based on the regularities disclosed, the process being investigated;

- to analyse the results of modelling and benchmark them against the corresponding parameters of the real process (system);

- based on the regularities disclosed, to elaborate recommendations aimed at enhancement of the effectiveness of the operation of the process (system) being investigated.

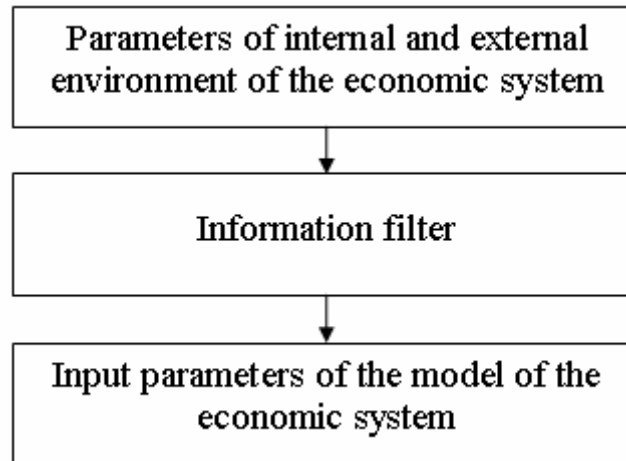The process of formalisation of input parameters is reflected in fig. 6.

```
┌─────────────────────────────────────┐
│  Parameters of internal and external │
│  environment of the economic system  │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│          Information filter          │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│  Input parameters of the model of the│
│           economic system            │
└─────────────────────────────────────┘
```

Figure 6. Process of formalisation of model input parameters.

Decision-making is the process of selection of one or several possible alternatives. Decision is the result of the decision-making process hereinafter referred to as the decision-making process.

All types of economic decisions may be subdivided into the following two groups:
- programmed decisions;
- non-programmed decisions.

If some specific problem is recurrent (i.e., occurs frequently), managers usually resolve it by applying a routine scenario. Decisions taken in such a way are considered to be programmed decisions. Such decisions do not require big time expenditure and efforts, since they are connected with the use of already established rules and programmes.

If a particular case has characteristics, which have not been encountered in resolving previous problems, a specific approach is needed. Such decisions are defined as non-programmed decisions and they are taken when resolving new non-standard problems. Figure 7 presents the process of making programmed and non-programmed decisions.
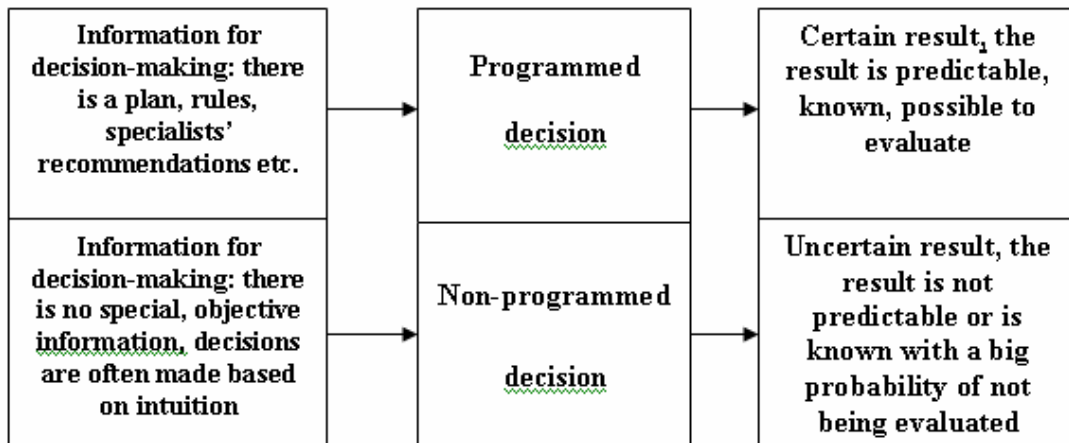
| Information for decision-making: there is a plan, rules, specialists' recommendations etc. | Programmed decision | Certain result, the result is predictable, known, possible to evaluate |
| Information for decision-making: there is no special, objective information, decisions are often made based on intuition | Non-programmed decision | Uncertain result, the result is not predictable or is known with a big probability of not being evaluated |

Figure 7. Process of making programmed and non-programmed decisions.

Decision alternative means establishment of one single option of operation, but a decision alternative very often can consist of a simultaneous establishment of several operation parameters. In connection with mathematically defined decision models, decision alternatives are all possible operation alternatives, including also the ones that are impossible to implement at all; exclusion of such alternatives is made by means of additional conditions.

An increase of the amount of information does not yet mean enhancement of the effectiveness of the decision. Therefore, in the decision-making process it is very important to differentiate between relevant and useless or irrelevant information.

The output data must be registered, by selecting the data that do not relate to the specific problem, leaving only the data necessary to be used in the decision-making process. In addition, the neces-
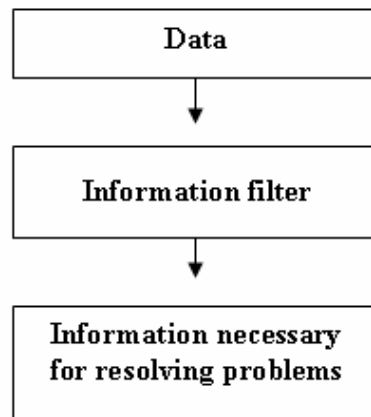
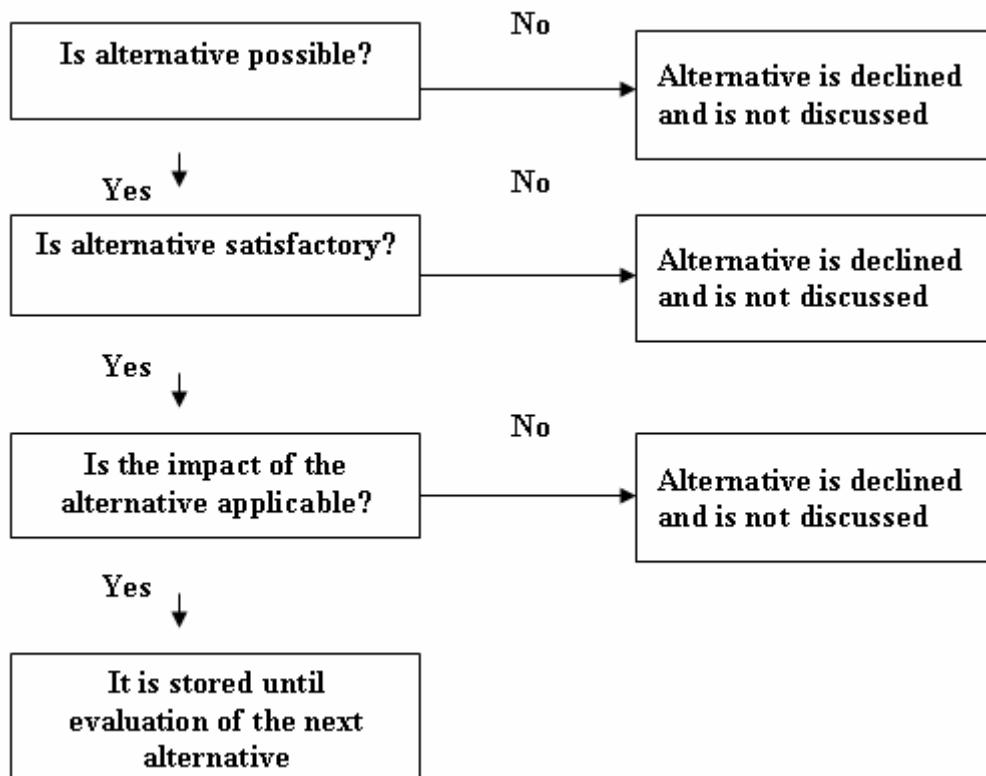**Figure 8. Data selection in the decision-making process.**

Figure 9. Evaluation of alternatives in the decision-making process.

sary information directly refers to the specific problem, person, goal, and time period (fig. 8).

Fig. 9 shows the algorithm for evaluation of problem alternatives.

The use of up-to-date information technologies in the educational process will contribute to the enhancement of the quality of specialists trained, as well as to the improvement and optimisation of the process of resolving problems.

References

1. Jansons V., Jurenoks V. Ekonomiska modelesana. – Riga: RTU Izdevnieciba, 2005. – 219 lpp.
2. Диденко К. К., Страдере М. Взаимодействие проектов народного хозяйства и социально-экономической среды // Економічний вісник 2005(2) – Київ, НТУУ „КПИ". – 2005. с. 44 – 52.
3. Иммитационное моделирование .- Классика CS. 3-е изд.- СПб.: Питер; Киев: Издательская группа BHV, 2004. – 847 с.:ил.
4. Хэмди А., Таха Х. Введение в исследование операций. Пер. с англ. – М.: Издательский дом " Вильямс", 2001. – 912 с., ил.