



# Surveys and studies

Innovation perspective  
In Ukrainian IT- Educational  
Standards



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## INTRODUCTION

Creating a culture of innovation in contemporary Ukraine is one of the key objectives of the national economic development and Euro integration. Furthermore, the existence of effective environment for innovation in the globalized economy is actually one of the conditions for existence and development of any company in general. According to a number of research, the majority of business representatives in Ukraine are considering innovation as buying foreign technologies and equipment or purchasing off-the-shelf technologies for a song in a research institute. As a result, entrepreneurs have a very negative attitude towards most academic research and research institutes as sources of innovation projects without any practical purposes. And they are often right because most innovation projects are not integral, have nothing to do with industrial technologies and they are carried out without detailed market research. Manufacturers have to solve a number of problems related to the implementation of this technology: from legal issues to the marketing promotion strategy. They can perform none of these tasks in a good and workmanlike manner. So today in Ukraine there is hardly any comprehensive approach to the formation of innovation environment, despite the great scientific and technological potential of the country. In general innovation in Ukraine can be regarded as a set of scientific, technological, organizational, financial and commercial measures aimed at the commercialization of knowledge, technologies and equipment. Being officially a priority activity, the government support is often declarative. And the government cannot be blamed for this because the concept of innovation culture is just emerging in Ukraine. According to the legal basis of Ukraine, innovation is the activity focused on use and commercialization of scientific findings and promotion of new competitive goods and services at the market. The primary objective of national innovation policy is to create the socio-economic, organizational and legal conditions for effective reproduction, development and use of scientific and technical potential, implementation of cutting-edge, environmentally friendly, safe, energy and resource saving technologies, production and promotion of new competitive products [1].

In Ukraine there are several types of innovations:

- **Technical** innovations appear in the production of new products or products with improved properties;
- **Technological** innovations appear when improved methods of production are applied;
- **Organizational and management** innovations are related to the processes of optimal organization of production, transport, distribution and supply;
- **Information** innovations are implemented to organize rationally information flow in science, technology and innovation, to improve reliability and timeliness of information;
- **Social** innovations are aimed at improving working conditions, solving problems related to health, education and culture.

Among innovation levels in Ukraine the level of research at universities and different educational institutions should be mentioned. This includes developments, inventions and research which are conducted in study groups at schools and in laboratories, clubs of technical creativity. Students and schoolchildren take an active part in creating and inventing new products. Ukrainian schoolchildren and students make inventions in different spheres of science and technology, and then many of these inventions are developed commercially. Unfortunately, Ukraine is experiencing economic crisis nowadays, so the government had to cut off funding to study groups and centers of technical creativity for young people. In western universities professors are often employed in research institutes which cooperate with private firms. Consequently, research institutes, whose goal is technology transfer, maintain a close relationship with both universities and industry. Professors are allowed by the university authorities to create private research centers, which are independent legal entities on the university campus. In Ukraine, despite the high scientific and technical potential of research organizations and universities, the most crucial issue is to create a culture of innovation exactly at this level. We need a clear policy on how to work with students and involve them in all stages of the innovation project, to form the basic knowledge about preparation and implementation of innovation projects etc. A comprehensive program for research organizations' staff is also required because the level of their activity in the field of innovation can be characterized as "extremely

poor". The autonomy of universities needs diversifying sources of research funding, replacing government financing. The long-term goal of the autonomy is to fully reimburse the money spent on research. To fulfill this goal, universities should be converted into a vehicle to transfer scientific ideas to industry and society as implemented innovations.

The important role of education in promoting more entrepreneurial attitudes and behaviors is now widely recognized. However, the benefits of entrepreneurship education are not limited to start-ups, innovative ventures and new jobs. Entrepreneurship refers to an individual's ability to turn ideas into action and is therefore a key competence for all, helping young people to be more creative and self-confident in whatever they undertake. The Bologna process can have a positive effect on the way entrepreneurial knowledge is spread. The 46 Bologna signatory countries met in London in May 2007, and recommended such measures as the recognition of non-formal learning, the development of flexible curricula to accommodate student and staff mobility, and enhanced university-employer collaboration in innovation and knowledge transfer [3]. At higher education level, the primary purpose of entrepreneurship education should be to develop entrepreneurial capacities and mindsets. In this context, entrepreneurship education programs can have different objectives, such as: a) developing entrepreneurial drive among students (raising awareness and motivation); b) training students in the skills they need to set up a business and manage its growth; c) developing the entrepreneurial ability to identify and exploit opportunities. Graduates' start-up is one of a range of possible outcomes. Currently the teaching of entrepreneurship is not yet sufficiently integrated in higher education institutions' curricula. So the real challenge is to build inter-disciplinary approaches, making entrepreneurship education accessible to all students, creating teams for the development and exploitation of business ideas, mixing students from economic and business studies with students from other faculties and with different backgrounds [3]. The demand for learning about entrepreneurship is increasing. However, there is a shortage of human resources and funding for this type of education; therefore it is not possible to meet this demand fully. Action-oriented teaching is labor – Intensive and costly, and require specific training. There is a need to graduate enough PhD students in entrepreneurship who

can become teachers. Moreover, there is very little in terms of incentives to motivate and reward teachers for getting involved in entrepreneurial teaching and interaction with students. It is currently difficult to build a career in entrepreneurship, as research remains the main promotion criterion [3]. Developing and delivering entrepreneurship is significantly affected by the internal organizational structure of an institution. Faculties and departments tend to work quite separately, with many obstacles for students who want to move and for teachers interested in establishing cross-disciplinary courses. A rigid curriculum structure is often an impediment to interdisciplinary approaches. In terms of specific contents, programs and courses should be adapted to different target groups (by level: undergraduate, graduate, post-graduate, PhD; by field of study: economics/business, scientific/technical studies, humanities, arts & design, etc.). The best way to encourage entrepreneurship among students is by giving examples from the relevant technical area. As regards current teaching methods, there are a wide range of techniques to supplement lectures as the most basic teaching tool. However, there seems to be a gap between the methods actually used and those that are viewed as the most effective and appropriate. Using experience-based teaching methods is crucial to developing entrepreneurial skills and abilities. Traditional educational methods (like lectures) do not correlate well with the development of entrepreneurial thinking [3]. There is a need for more interactive learning approaches, where the teacher becomes more of a moderator than a lecturer. Crossing boundaries between disciplines, and multidisciplinary collaboration, are essential elements in building enterprising abilities. Getting real entrepreneurs involved in the teaching can make up for the current lack of practical experience among professors. Although entrepreneurs and business practitioners are in general involved in the teaching, there are few examples of entrepreneurial practitioners engaged in the full curricula experience. Most frequently, they come to give short presentations to students (e.g. as personal testimonials or guest lecturer) or as judges in competitions. European higher education institutions are not sufficiently involved and effective in working with alumni who have been successful in their entrepreneurial endeavours, and who could bring back knowledge and funds [3]. Also, mobility of teachers and researchers between higher education institutions and business is in general very low, and this practice is not actively

encouraged. There are in many cases few or no incentives, and in some cases outright disincentives. The strength that gives higher education institutions an innovative capacity, and hence entrepreneurial potential, is their autonomy. While diversity is richness, institutions and educators will gain from exchanges and mutual learning, open sources of information, examples of good practice across Europe. Coordination is needed at a policy level to ensure that all higher education institutions are given the necessary incentives and opportunities to take on this challenge. It is very important to determine how entrepreneurship can be integrated into primary, secondary, and higher education; adopt legislation supporting relations between private business and universities; establish awards for entrepreneurial universities, teachers and students, and promote positive examples of academic spin-offs. At their level of responsibility, higher education institutions could: set up a strategy and an action plan for teaching and research in entrepreneurship, embedding practice-based activities, and for new venture start-ups and spin-offs; create an entrepreneurship education department, which would serve as an entrepreneurial hub within the institution and spread the teaching of entrepreneurship across all other departments; offer an introduction to entrepreneurship and self-employment to all undergraduate students during their first year. In addition, give all students the opportunity to attend seminars and lectures in this subject; set up incentive systems to motivate and reward faculty staff in supporting students interested in entrepreneurship, and acknowledge the academic value of research and activities in the entrepreneurial field; develop clear institutional rules about intellectual property; award academic credits for practical work on enterprise projects outside the established courses [3]. The important role of education in promoting more entrepreneurial attitudes and behaviors, starting even at primary school. Entrepreneurial programs and modules offer students the tools to think creatively, be an effective problem solver, analyse a business idea objectively, and communicate, network, lead, and evaluate any given project. Students feel more confident about setting up their own business as they can now test their own business ideas in an educational, supportive environment. However, the benefits of entrepreneurship education are not limited to boosting start-ups, innovative ventures and new jobs. Entrepreneurship is a competence for all,

helping young people to be more creative and self-confident in whatever they undertake.

Universities and technical institutions (e.g. polytechnics) should integrate entrepreneurship as an important part of the curriculum, spread across different subjects, and require or encourage students to take entrepreneurship courses. Special attention should be paid to systematically integrating entrepreneurship training into scientific and technical studies and within technical institutions, to facilitate spin-offs and innovative start-ups, and to help researchers acquire entrepreneurial skills. There needs to be more focus on developing the skills necessary for fully exploiting innovation and knowledge transfer activities in combination with the commercialization of new technologies [2].

## CHAPTER 1

### LAW ON INNOVATION ACTIVITY IN UKRAINE

The Law defines legal, economic and organizational principles of state regulation of innovation activity in Ukraine [1]. The objects of innovation activity are:

- innovation programs and projects;
- new knowledge and intellectual products;
- production equipment and processes;
- infrastructure of production and entrepreneurship;
- organizational technical decisions of production, administrative, commercial or other nature, which significantly improve the structure and the quality of production and (or) social sphere;
- raw materials, means of their mining and processing;
- commodity output;
- mechanism of consumer market forming and sale of commodity output.

The subjects of innovation activity may be natural persons and (or) legal entities of Ukraine, natural persons and (or) legal entities of foreign states, stateless persons, their associations, which conduct innovation activity in Ukraine and (or) attract property and intellectual values, invest own or borrowed funds in the implementation of innovation projects in Ukraine.

Pursuant to the Law, the state regulation of innovation activity is performed as follows:

- definition and support of priority directions of innovation activity on state, branch, regional and local levels;
- forming and implementation of state, branch, regional and local innovation programs;
- creation of normative legal base and economic mechanisms for support and stimulation of innovation activity;
- protection of rights and interests of the subjects of innovation activity;
- financial support of implementation of innovations projects;
- encouragement of commercial banks and other financial crediting establishments, which credit implementation of innovations projects;

support of functioning and development of contemporary innovation infrastructure. The subjects of innovation activity may obtain financial support for implementation of financial projects by:

- full interest-free crediting (under the conditions of inflation indexation) of priority
  - innovation projects at the expense of funds of the State Budget of Ukraine, budget
    - funds of the Autonomous Republic of Crimea and funds of local budgets;
    - partial (up to 50%) interest-free crediting (under the conditions of inflation indexation) of priority innovation projects at the expense of funds of the State Budget of Ukraine, budget funds of the Autonomous Republic of Crimea and funds of local budgets on condition, provided that the other funds necessary for project financing were invested by the project agent and (or) other subjects of innovation activity;
    - full or partial reimbursement (at the expense of funds of the State Budget of Ukraine, budget funds of the Autonomous Republic of Crimea and funds of local budgets) of interests paid by the subjects of innovation activity to commercial banks and other financial crediting establishments for crediting of innovation projects;
    - granting of state guarantees to commercial banks which credit priority innovation projects;
    - property insurance of implementation of innovation projects by the insurers in compliance with the Law of Ukraine "On Insurance".

The sources of financial support of innovation activity shall be:

- funds of the State Budget of Ukraine;
- funds of local budgets and funds of the Autonomous Republic of Crimea;
- own funds of specialized state and communal innovation financial crediting establishments;
- own or borrowed funds of subjects of innovation activity;
- other sources which are not prohibited by the legislation of Ukraine [3].

Universities activities from primarily regulated by the Law of Ukraine "On Higher Education". This Law hasn't questions concerning innovative activities, innovative research, but Chapter 10 of Law is devoted to research and scientific activities in the universities. In this chapter discusses the purpose and objectives of scientific and

scientific-technical activities in higher education, organization and management of scientific and technical activities. Also it has links to two documents – to the Law of Ukraine " On Higher Education " and the Law of Ukraine "On the scientific and technical activities", the second one determines legal, organizational and financial principles of operation and development of scientific and technical sphere, creates conditions for scientific and scientific-technical activities, ensuring needs of society and the state in technological development.

There are a set of laws dealing with innovations in Ukraine [1]:

- the Law of Ukraine "On the innovation"
- the Law of Ukraine «On the scientific and technical activities»
- the Law of Ukraine «On priority directions of innovative activity in Ukraine»
- the Law of Ukraine «On special regime of technological parks»
- the Law of Ukraine «On the scientific and technical information»
- the Law of Ukraine «On the scientific and technical expertise»
- the President of Ukraine Decree of 30.12.2005, № 1873/2005 "On the Establishment of the State Agency of Ukraine for Investments and Innovations"
- the Decree by Ministry of Education and Science of Ukraine "On Approval of the Procedure of innovative educational activities" (from 07.11.00, № 522)
- the Decree by Ministry of Education and Science of Ukraine «On Approval of monitoring the implementation of innovative projects in the priority areas of technological parks» (from 17.04.03, № 245).
- the Decree of the President of Ukraine from 07.11.2006 № 606/2006 "On the decision of the National Security and Defense Council of Ukraine on April 6, 2006" On the state of scientific and technological areas and measures to support innovative development of Ukraine "
- the Verkhovna Rada of Ukraine "On Compliance for the development of scientific and technological capacity and innovation activity in Ukraine" (№ 1786-VI).
- the Civil Code of Ukraine (Chapter IV "Intellectual Property")

- the Law of Ukraine «On Property»
- the Law of Ukraine «On state regulation in the field of technology transfer»

Such legal documents can be divided into two groups: base and specific. Base acts are laws, which regulate economic activity in general, and these laws itself do not create the special favorable conditions for establishing of innovation business. Specific laws are laws and legal acts, which take into account the specific of scientific and technical and innovation activity, such normative acts which more or less expressly determine the subjects of innovation sphere. We will consider Laws of Ukraine “About general principles of creation and functioning of the special economic zones (further SEZ) in Ukraine”, “About the special mode of investment and innovation activity of technological parks in Ukraine” and Statute about the order of creation and functioning of technoparks and innovation structures of other types. As Ukraine is a young state, there is not enough experience on establishing technoparks; moreover nowadays there are some confusions in legislation background of technoparks activity.

So, in the Law of Ukraine “About SEZ” technopark and technopolis are considered as such special economic zone. It automatically determines the order of their creation, essence of which is that technostructure is created by the Parliament of Ukraine after presentation of the Government, President of Ukraine or local governments. Such process of establishing, obviously, cannot assist to development of technostructure, as, at first, creation takes the heap of time; secondly, enterprises and other organizations can not support this technopark, and thirdly, technoparks in this terms are dependent on Government.

Moreover it is not the same technopark and SEZ, as there is a wide difference between them: different goals, different organizational aspects. So, the representatives of universities or scientific units are necessarily presence in the organization structure of technostructure, moreover they act leading part in the management of technopark activity; unlike SEZ, where such role belongs to public authorities and local government. The process of decision making about implementation of innovation & investment project changes according to it. Also approval of project of activity and constituent documents is carried out by Committee

for support of the technoparks and other innovation structures development and has aimed to receipt of innovation status. It means actually that a definite economy subject can be a technopark structure, but formally not be legislatively acknowledged, and consequently, do not get definite preferences [3].

## CHAPTER 2

### STUDIES OF INNOVATION PERSPECTIVE IN UKRAINIAN EDUCATION STANDARDS

According to the action plan about the development of education in the field of information technologies in 2013, approved by the Cabinet of Ministers of Ukraine dated September 21, 2011 № 1036, the problem of increasing importance of innovation and entrepreneurial component in professional training for IT industry in Ukrainian Higher Education Institutions (HEIs) was analyzed by Tempus group.

In connection with Ministry of Education and Science, Youth and Sport of Ukraine the questionnaire for high schools in Ukraine was developed (Appendix A). Total number of Universities which took part in this analysis was 97 Universities of 3-4 accreditation levels that train bachelors, specialists and masters for IT industry.

The list of Master and Bachelor programs for IT professionals all over Ukraine is presented in Table 1.

Table 1 - List of training directions for IT professionals

The area of knowledge	Training direction of Bachelors	Specialties training of Specialists	Specialties training of Masters
Computer Science and Engineering	6.050102 Computer Engineering (CE)	7.05010201 Computer Systems and Networks (CSN)	8.05010201 Computer Systems and Networks (CSN)
		7.05010202 System Programming (SP)	8.05010202 System Programming (SP)
		7.05010203 Specialized Computer Systems (SCS)	8.05010203 Specialized Computer Systems (SCS)

The area of knowledge	Training direction of Bachelors	Specialties training of Specialists	Specialties training of Masters
	6.050101 Computer Science (CS)	7.05010101 Information Management Systems and Technologies (by industry) (IMST)	8.05010101 Information Management Systems and Technologies (by industry) (IMST)
		7.05010102 Information Design Technology (IDT)	8.05010102 Information Design Technology (IDT)
		7.05010103 Systems Engineering (SysE)	8.05010103 Systems Engineering (SysE)
		7.05010104 Artificial Intelligence Systems (AIS)	8.05010104 Artificial Intelligence Systems (AIS)
	6.050103 Software Engineering (SE).	7.05010301 Software Systems (SS)	8.05010301 Software Systems (SS)
		7.05010302 Software Engineering (SE)	8.05010302 Software Engineering (SE)
	Information Security	6.170101 Information Security and Communication Systems (ISCS)	7.17010101 Information Security and Communication Systems (ISCS)
System sciences and Cybernetics	6.040302 Informatics (Inf)	7.04030201 Informatics (Inf)	8.04030201 Informatics (Inf)
		7.04030202 Applied Informatics (AI)	8.04030202 Applied Informatics (AI)
		7.04030204 Information and	8.04030204 Information and

		Communication Technologies(ICT)	Communication Technologies(ICT)
	6.040301	7.04030101 Applied Mathematics (AP)	8.04030101 Applied Mathematics (AP)
	Applied Mathematics (AP)	7.04030103 Mathematical and Computer Modeling (MCM)	8.04030103 Mathematical and Computer Modeling (MCM)

All Universities are grouped according to the cities and regions in Ukraine in Fig.1.



Fig. 1 – Conditional distribution Ukraine by region

The following problems were analyzed:

- Curricula for all Master, Specialist and Bachelor programs for IT training .
- Syllabus of the courses in innovation and entrepreneurship.
- Syllabus and work programs in specialty 8.18010012 “Innovation management”.

## 2.1 Geography of IT Specialist Training

The number of High Educational Institutions (HEI) that train IT bachelors, specialists, masters in Ukrainian cities is presented in Table 2, in diagram - Figure 2. For example, in Dnipropetrovsk 9 universities train IT bachelors, specialists, masters, which makes 9% of the total 97 universities in Ukraine that also train IT professionals.

Table 2 - Number of Universities that train Bachelors, Specialists and Masters of IT

City	Number of Universities that train Bachelors, Specialists and Masters of IT
Dnipropetrovsk	9
Donetsk	7
Luhansk	3
Kharkiv	7
Ivano-Frankivsk	2
Lutsk	3
Lviv	5
Rivne	2
Ternopil	2
Uzhhorod	2
Chernivtsi	3
Vinnytsia	1
Zhytomyr	4
Kyiv	14
Kirovohrad	2
Poltava	4
Sumy	1
Khmelnyskyi	2

City	Number of Universities that train Bachelors, Specialists and Masters of IT
Cherkasy	2
Chernihiv	2
Zaporizhzhia	7
Crimea	4
Mykolaiv	2
Odesa	4
Kherson	3
Total	97

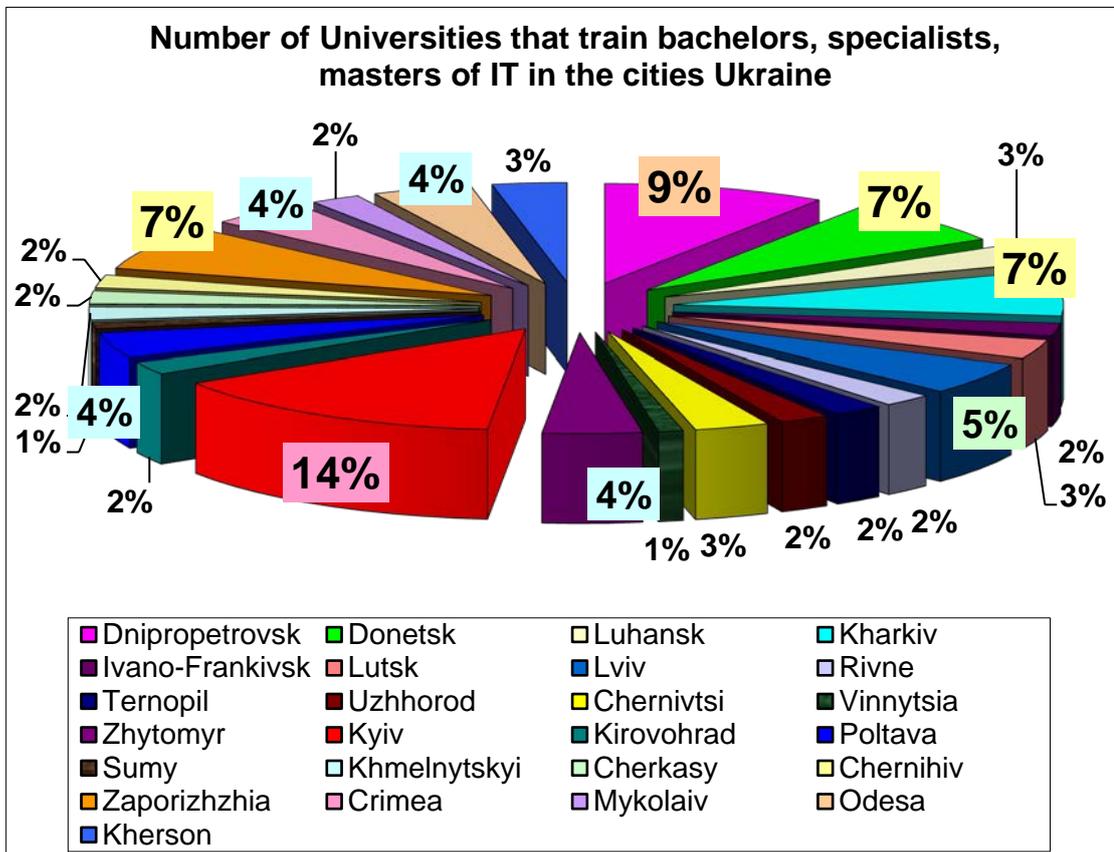


Fig. 2- Number of Universities that train IT bachelors, specialists, masters in the cities of Ukraine

According to the number of universities training IT professionals:

The 1<sup>st</sup> place goes to Kyiv - 14%

The 2<sup>nd</sup> place - to Dnepropetrovsk - 9%

The 3<sup>rd</sup> place was shared by Donetsk, Zaporozhye, Kharkov 7%

The 4<sup>th</sup> place - to Lviv - 5%

The 5<sup>th</sup> place was shared by Zhitomir, Crimea, Odessa, Poltava -4%

The number of universities training IT bachelors, specialists, masters in Ukrainian cities is presented in Table 3, in the diagram – Fig. 3.

Table 3 - Number of Universities that train IT bachelors, specialists, masters in the regions of Ukraine

Region	Number of Universities that train IT bachelors, specialists, masters in the regions of Ukraine
East	26
West	19
Central	32
South	20
Total	97

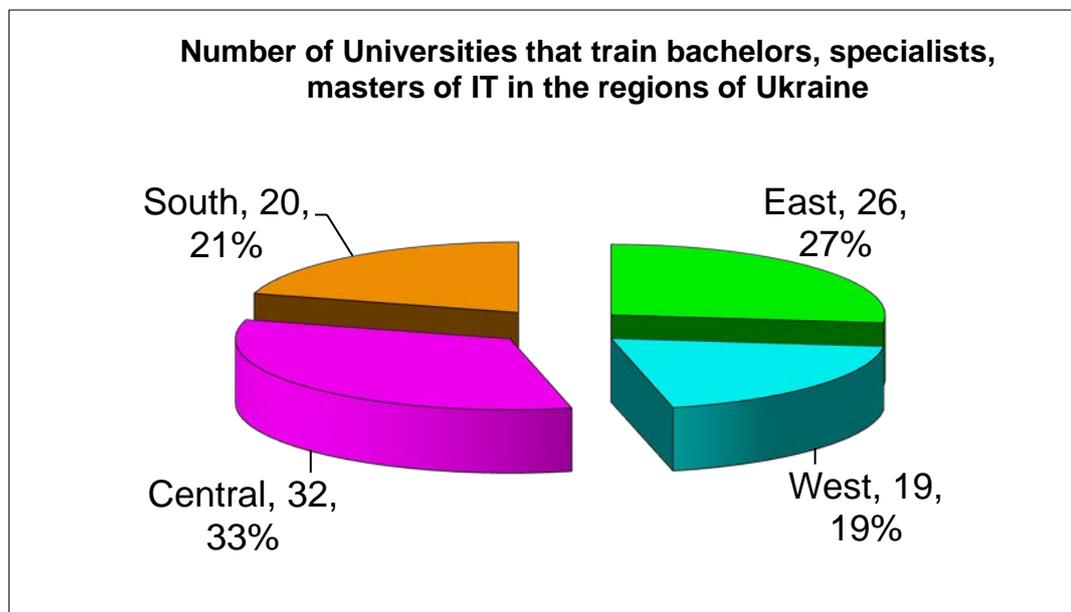


Fig. 3 - Number of Universities that train bachelors, specialists, masters of IT in the regions of Ukraine

Therefore, according to the number of universities training IT professionals:

The 1<sup>st</sup> place goes to the central and northern regions -32 universities, 33%

The 2<sup>nd</sup> place – to the eastern region - 27 universities, 27%.

The 3<sup>rd</sup> place –to the southern region – 20 universities, 21%.

The 4<sup>th</sup> place – to the western region - 19 universities, 19%.

**292 syllabuses** of the courses dealing with innovation and entrepreneurship in bachelor, specialist, master training at universities in Ukraine were processed.

In addition, curricula and their contents, syllabi in specialty 8.18010012 “Innovation Management” at 14 universities in Ukraine were analyzed.

## 2.2 List of courses dealing with issues of innovation and entrepreneurship in IT bachelor training

In the curricula of bachelor training for IT industry in different sections of the curricula (a course of vocational training, a course how to choose universities, an elective course) there are some disciplines which fall into the economic category according to their names and topics, but in the work programs of these disciplines the problems of innovation and entrepreneurship are discussed. It should be noted that the number of hours for these subjects is 2 - 3,6 ECTS, and the classroom load is the following: 16-18 hours for lectures, 8-16 hours for practice or laboratory work. Within these courses problems of innovation and entrepreneurship take only 2 class hours.

In the curricula of IT bachelor training there are no disciplines that fully meet the requirements for studying innovation and entrepreneurship.

The analysis is given in Tables 4 - 9 and in the diagrams are in Fig.4-9.

Consider the information in Table 4. Bachelor training in the direction 6.050102 - Computer Engineering is delivered by six universities in the east, 4 - in the west, 9 - in the center, 8 - in the south.

Within the direction 6.050102 - Computer Engineering it is planned to develop courses which enable students to gain knowledge on innovation and entrepreneurship mainly economics and fundamentals of business management in market economy, registration of technical documentation, intellectual property.

The discipline "Economy and Business" is in the curriculum of 2 universities in the eastern region, it makes 33% of the total number of universities in the eastern region that deliver training in the direction 6.050102 - Computer Engineering, namely  $(2/6 * 100\%)$ . In the curricula of universities in the western and central regions such disciplines are not available, which makes 100%.

That is, in the east of Ukraine 2 of the 6 universities included the discipline "Economy and Business" in bachelor training curriculum in the direction 6.050102 - Computer Engineering and in this discipline according to the work program the issues of innovation and entrepreneurship are discussed.

Similarly, other disciplines were analyzed.

Table 4 - Bachelor training in the direction 6.050102

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.050102 - Computer Engineering	Number of Universities (by region) training Bachelors in the direction 6.050102 - Computer Engineering							
	East		West		Central-		South	
Region	6	%	4	%	9	%	8	%
Economy and Business	2	33						
Fundamentals of management in market economy	1	17						
Registration of technical documentation	1	17						
Intellectual Property							1	13
The absence of such subjects in the curriculum	2	33	4	100	9	100	7	88

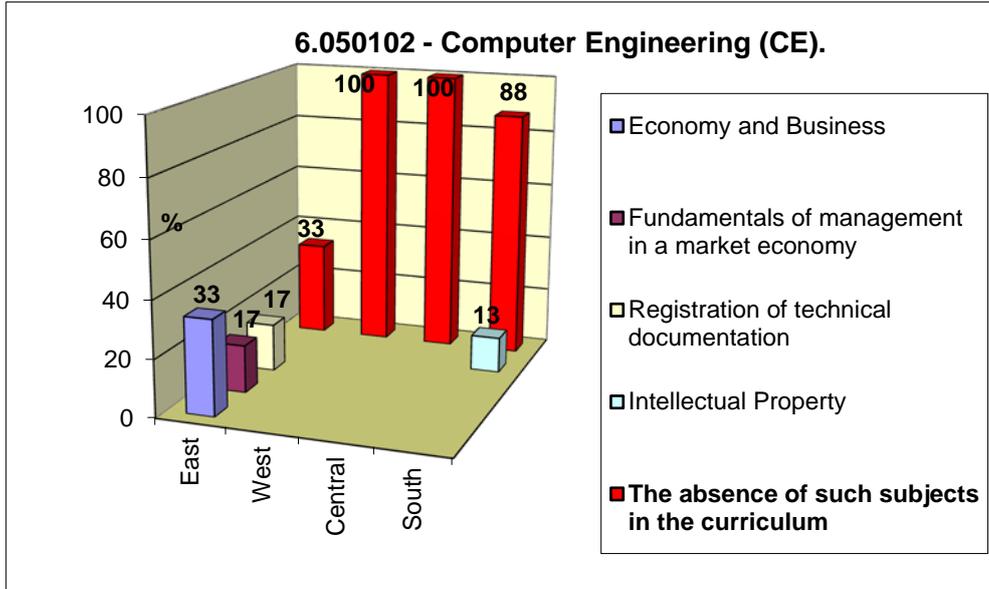


Fig. 4 - Disciplines dealing with innovation and entrepreneurship in Bachelor program 6.050102

Table 5 - Disciplines dealing with innovation and entrepreneurship in Bachelors program 6.050101 - Computer Science

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.050101 - Computer Science	Number of Universities (by region) training Bachelors the direction 6.050101 - Computer Science							
	East-7		West-5		Central-9		South-7	
Region	7	%	5	%	9	%	7	%
Management	1	14						
Economy and Business	3	43	1	20	3	33	2	29
Basics of technical creativity	1	14						
Basic scientific research	1	14						
Legal support of business	1	14					1	14
The absence of such subjects in the curriculum			4	80	6	67	4	57

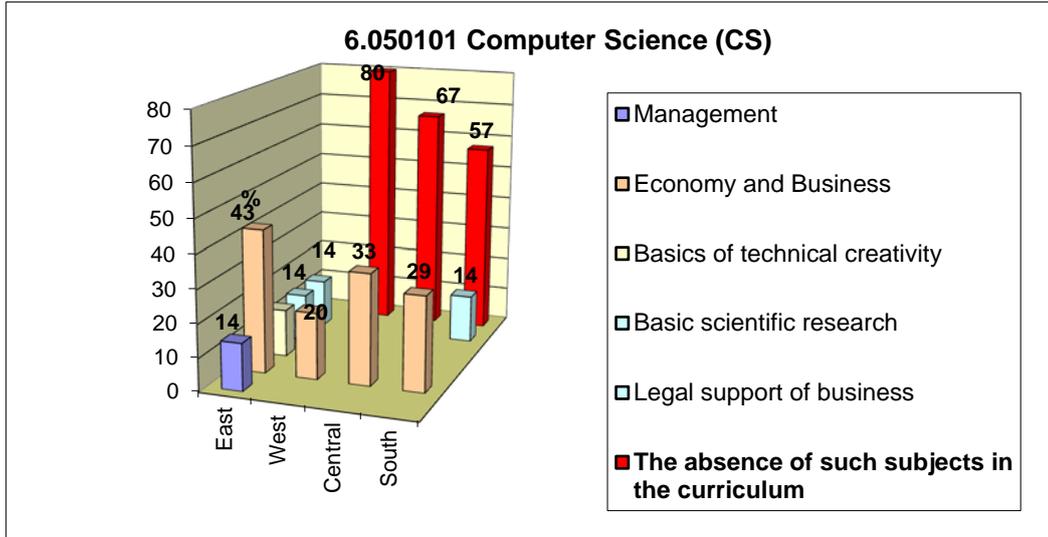


Fig. 5 - Disciplines dealing with innovation and entrepreneurship Bachelors program 6.050101 - Computer Science

Table 6 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.050103 - Software Engineering

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.050103 - Software Engineering	Number of Universities (by region), which train Bachelors the direction 6.050103 - Software Engineering							
	East-4		West-3		Central-9		South-7	
Region	4	%	3	%	9	%	7	%
Economy software	2	50			2	22		
Fundamentals of Entrepreneurship and Business Planning	1	25			1	11		
Intellectual Property	1	25			1	11		
The absence of such subjects in the curriculum			3	100	5	56	7	100

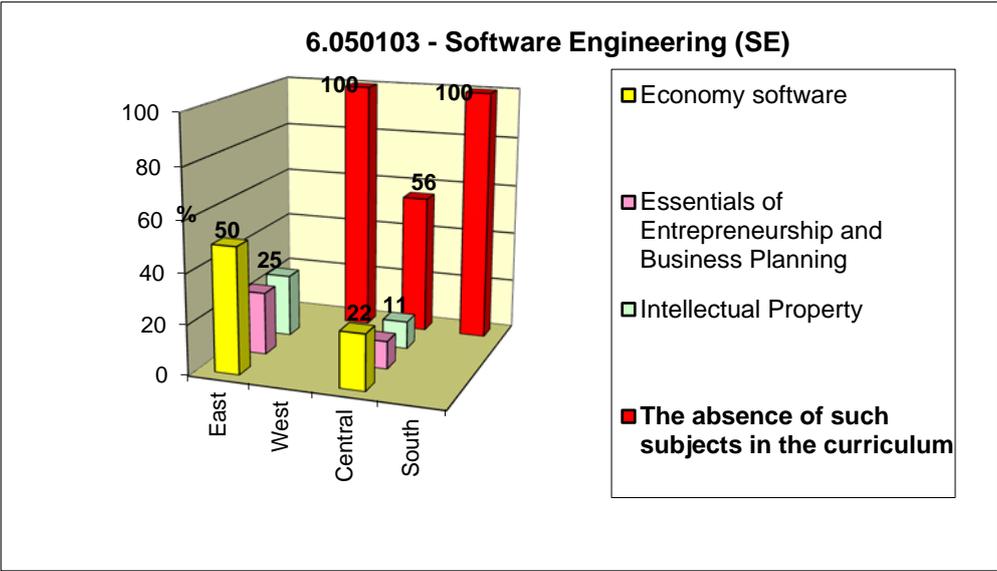


Fig. 6 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.050103 - Software Engineering

Table 7 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.170101

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.170101 - Information Security and Communication Systems	Number of Universities (by region), which train Bachelors the direction 6.170101 - Information Security and Communication Systems							
	East-4		West-3		Central-4		South-1	
Region	4	%	3	%	4	%	1	%
The absence of such subjects in the curriculum	4	100	3	100	4	100	1	100

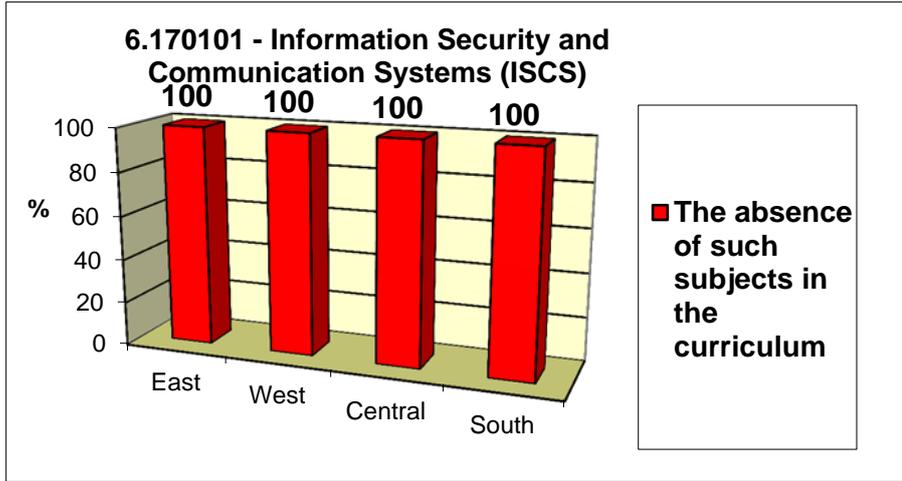


Fig. 7 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.170101

Table 8 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040302

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040302 - Informatics	Number of Universities (by region), which train Bachelors the direction 6.040302 - Informatics						
	East-6		West-8		Central-5		South-7
Region	6	%	8	%	5	%	7
Basic scientific research	2	33					
Certification and patenting	1	17					
The absence of such subjects in the curriculum	3	50	8	100	5	100	7

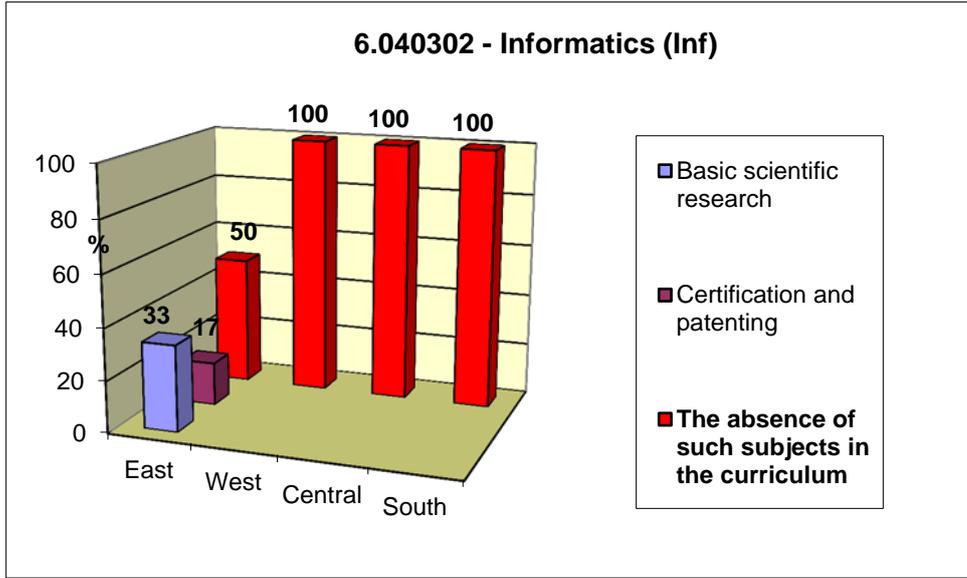


Fig. 8 Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040302

Table 9 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040301

Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040301 - Applied Mathematics	Number of Universities (by region), which train Bachelors the direction 6.040301 - Applied Mathematics							
	East-6		West-5		Central-6		South-4	
Region	6	%	5	%	6	%	4	%
Essentials of Entrepreneurship and Business Planning					1	17		
The absence of such subjects in the curriculum	6	100	5	100	5	83	4	100

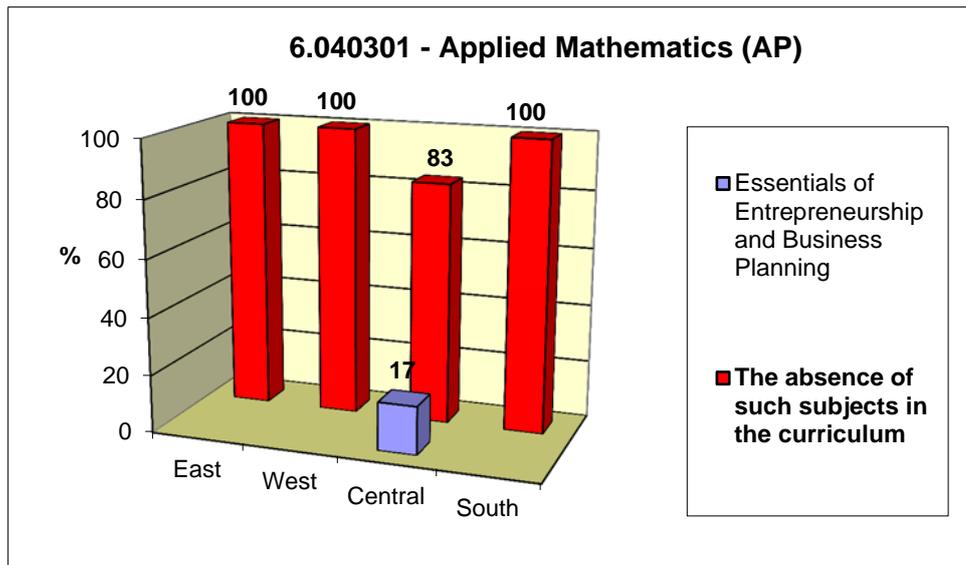


Fig. 9 - Disciplines dealing with innovation and entrepreneurship for Bachelor 6.040301

### 2.3 Disciplines dealing with issues of innovation and entrepreneurship in IT specialist and master training

Having analyzed the curricula for IT specialists and masters training, the problems of innovation and entrepreneurship are taught in the following disciplines:

- intellectual property;
- scientific and technical creativity;
- basics of marketing;
- management and marketing;
- economy and management;
- industrial economics and business management;
- economics and organization production of software;
- modern concepts of management;
- basics of patent and copyright;
- basic scientific research;
- methodology and organization of science;
- creation and commercialization of intellectual property;
- innovative training technology;
- management in education;

- methodology for industrial software development and intellectual property;
- economic efficiency of scientific research;
- philosophy of science and innovation.

The above-mentioned disciplines in different combinations but not for all IT directions are found in the curricula. Within the curricula in these disciplines the problems of innovation take 0.5 - 2 hours of the total class time.

However, it should be noted that the list of these courses is not obligatory for all universities that train IT specialists, including the discipline "Intellectual Property".

According to the order of the Ministry of Education and Science, Youth and Sport in Ukraine № 811 dated from 20.10.2004 "On the introduction of the discipline "Intellectual Property" in higher education institutions", the discipline "Intellectual Property" was recommended by the MESYSU's letter from June 11, 2003 N 1/9-303 to be implemented into educational and qualifying characteristics and educational and professional training programs for specialists and masters in all specialties and directions.

Since the discipline "Intellectual Property" is obligatory for specialist and master training, it is not taken into account in the analysis.

The discipline "Innovation Policy" and "Management of Innovation Projects" are taught to masters and specialists at Berdyansk State Pedagogical University in specialties 7 (8) .05010301 – System Software and 7 (8) .05010101 - Information Management Systems and Technologies.

The discipline "Creation and Commercialization of Intellectual Property" is studied by specialists and masters at Taras Shevchenko National University of Kiev in specialties 7 (8) .05010301 - Software Systems 8.04030101 - Applied Mathematics, 8.04030201 - Informatics.

The discipline "Economic Rationale of Innovative Solutions" is studied by masters at Donetsk National Technical University in specialties 8.05010201 - Computer Systems and Networks, 8.05010202 - System Programming.

The discipline "Information Systems in Innovation" is studied by masters at European University, in Kyiv in specialty 8.05010101 -- Information Management Systems and Technologies.

The disciplines "Economic Efficiency of Scientific Research" and "Philosophy of Science and Innovation" are taught to masters at the National University of Life and Environmental Sciences of Ukraine, in Kyiv in specialty 8.05010101 - Information Management Systems and Technologies.

In the curricula of IT specialists training in UHEIs there are no disciplines that fully meet the requirements for studying innovation and entrepreneurship.

In Tables 10-11 there is information about:

- the number of universities (by region), Number of Universities (by region), which train specialists and masters for IT industry,
- the name and the number of disciplines in the curricula of specialist and master training which enable students to gain knowledge and skills in innovation and.

Analysis of course availability in the curricula for specialists which provides students with gaining knowledge and skills in innovation and entrepreneurship is given in Charts 10 - 23 and Figures 10- 23.

Analysis of course availability in the curricula for masters which provides students with gaining knowledge and skills in innovation and entrepreneurship is given in Charts 24 -36 and Figures 24- 36.

Analysis of course availability in the curricula for specialists which provides students with gaining knowledge and skills in innovation and entrepreneurship given in Charts 10 - 23 and Fig. 10- 23.

Table 10 - Disciplines dealing with innovation and entrepreneurship for Specialists **7.05010302**

Disciplines dealing with innovation and entrepreneurship for Specialists <b>7.05010302 - Software Engineering</b>	Number of Universities with courses which have some topics of innovation and entrepreneurship for Specialists <b>7.05010302 - Software Engineering</b>							
	East		West		Central		South	
Region	3	%	2	%	2	%	1	%
Principles of Marketing			1	50				
Economy and management	1	33	1	50				
Certification, Standardization and Legal protection software					1	50		
The absence of such subjects in the curriculum	2	67			1	50	1	

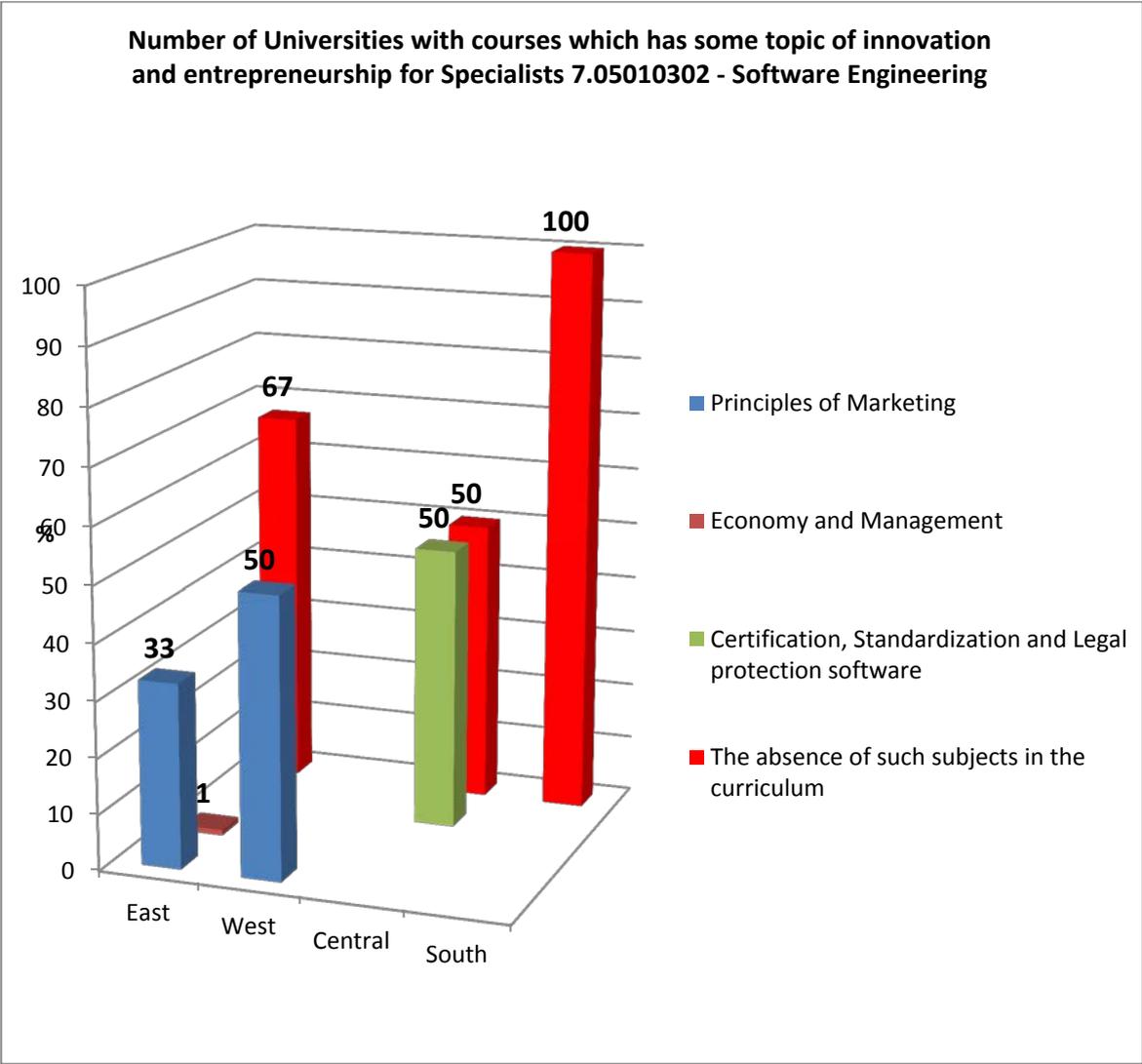


Fig. 10 Courses dealing with innovation and entrepreneurship for Specialists 7.05010302 - Software Engineering

Table 11 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010301

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010301 - Software Systems	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010301 - Software Systems							
	East		West		Central		South	
Region	4	%	3	%	8	%	5	%
Principles of Marketing			1	33	1	13		
Economy and Management	1	25	1	33				

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010301 - Software Systems	4	%	3	%	8	%	5	%
Basics of patent and copyright			1	33	1	13		
Innovation Policy							1	20
Managing innovation projects							1	20
Creation and commercialization of intellectual property					1	13		
Certification, standardization and legal protection software					1	13		
The absence of such subjects in the curriculum	3	75	0		4	50	3	60

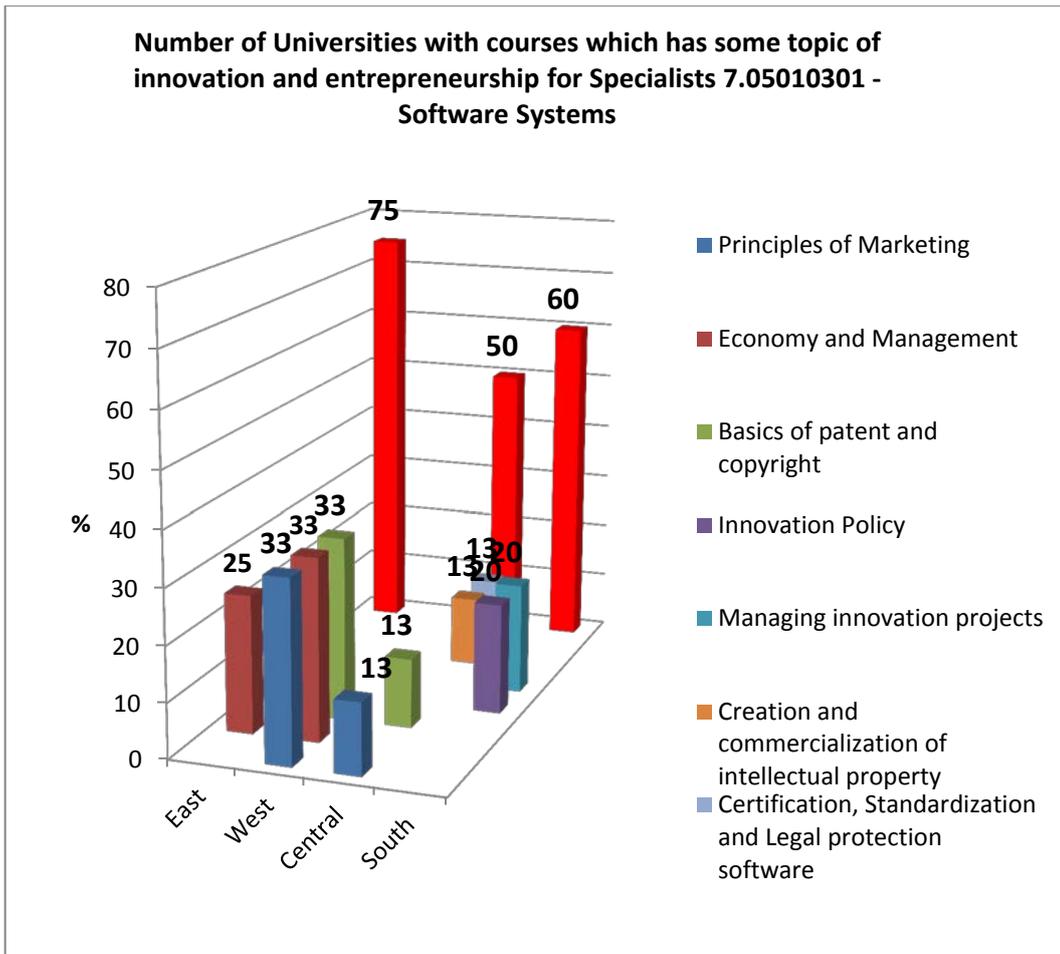


Fig. 11 – Courses dealing with innovation and entrepreneurship for Specialists 7.05010301 - Software Systems

Table 12 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010101

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010101 - Information Management Systems and Technologies (by industry)	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010101 - Information Management Systems and Technologies (by industry)							
	East		West		Central		South	
Region	9	%	2	%	6	%	5	%
Principles of Marketing			1	50				
Economy and Management	1	11	1	50				
Basics of patent and copyright			1	50	1	17		
Innovation Policy							1	20
Managing innovation projects							1	20
The absence of such subjects in the curriculum	8	89			5	83	3	60

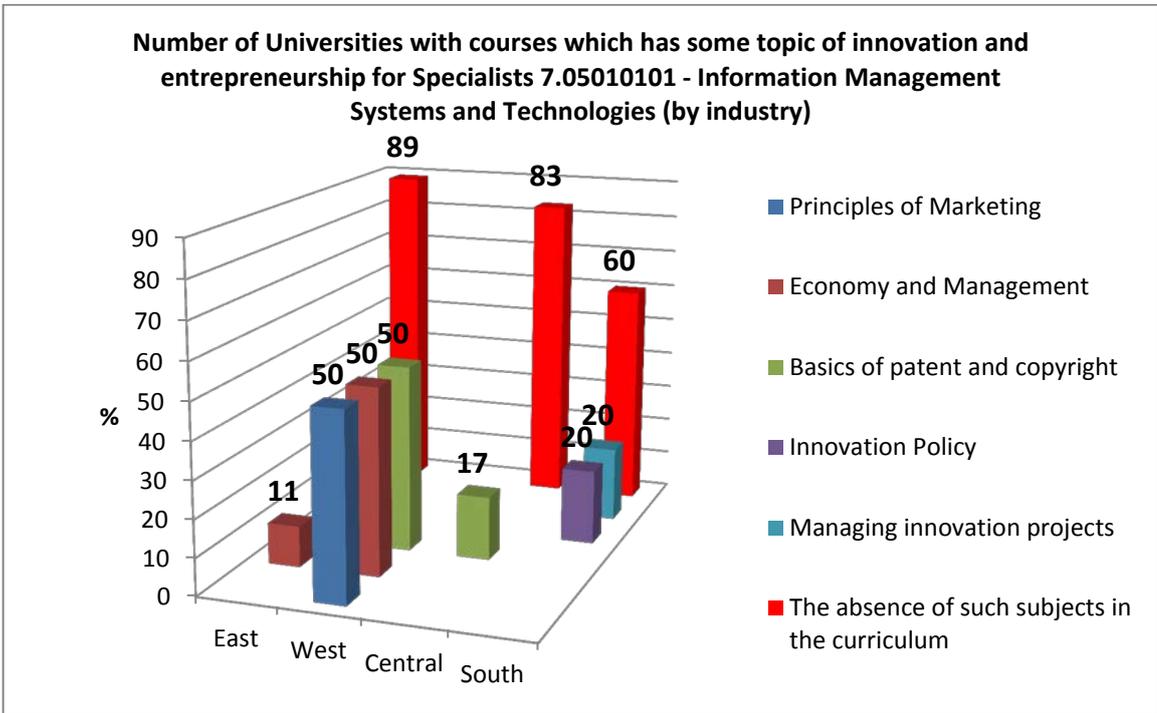


Fig. 12 – Courses dealing with innovation and entrepreneurship for Specialists 7.05010101 - Information Management Systems and Technologies

Table 13

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010102 - Information Design Technology	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010102 - Information Design Technology							
	East		West		Central		South	
Region	5	%	2	%	4	%	1	%
Principles of Marketing	1	20	2	100				
Economy and Management			1	50				
Basics of patent and copyright			1	50				
Certification, Standardization and Legal protection software					1			
The absence of such subjects in the curriculum	4	80			3	75	1	100

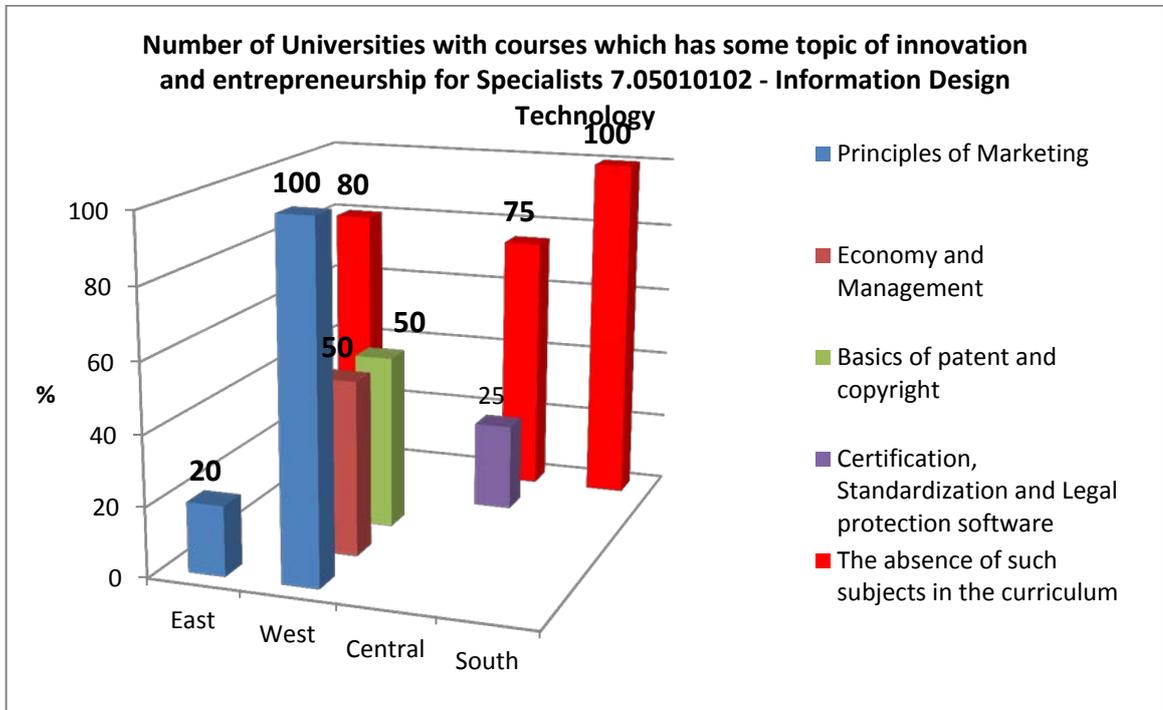


Fig. 13 – Courses dealing with innovation and entrepreneurship for Specialists 7.05010102 - Information Design Technology

Table 14 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010103 - Systems Engineering

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010103 - Systems Engineering	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010103 - Systems Engineering							
	East		West		Central		South	
Region		%	1	%	1	%		%
Principles of Marketing			1	100				
Economy and Management			1	100				
Basics of patent and copyright			1	100				
Basic scientific research					1	100		

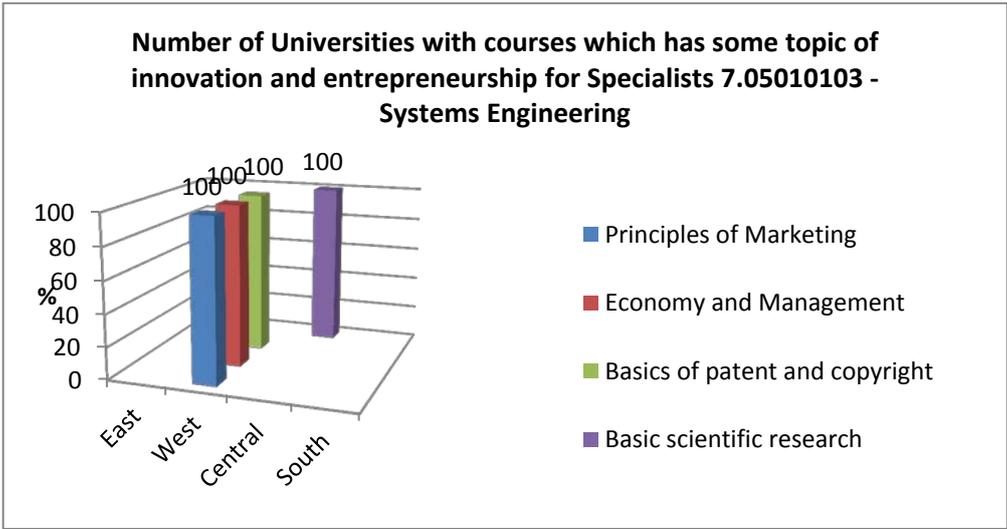


Fig. 14 – Courses dealing with innovation and entrepreneurship for Specialists 7.05010103 - Systems Engineering

Table 15 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010104

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010104 - Artificial Intelligence Systems	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010104 - Artificial Intelligence Systems							
	East		West		Central		South	
Region	2	%		%	1	%		%
The Production and Marketing	1	50						
The absence of such subjects in the curriculum	1	50			1	100		

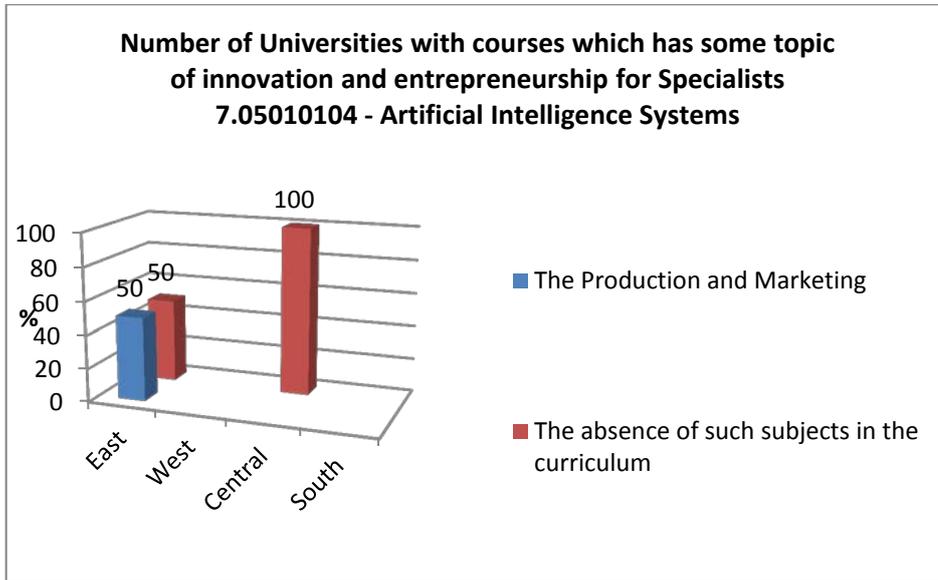


Fig.15 Courses dealing with innovation and entrepreneurship for Specialists 7.05010104

Table 16 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010201

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010201 - Computer Systems and Networks	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010201 - Computer Systems and Networks							
	East		West		Central		South	
Region	5	%	5	%	6	%	5	%
Technical and scientific creativity	1	20						
Principles of Marketing	1	20	1	20				
Economy and Management			1	20				
Modern concepts of Management					1	17	1	20
Basics of patent and copyright			1	20	1	17		
The absence of such subjects in the curriculum	3	60	2	40	4	67	4	80

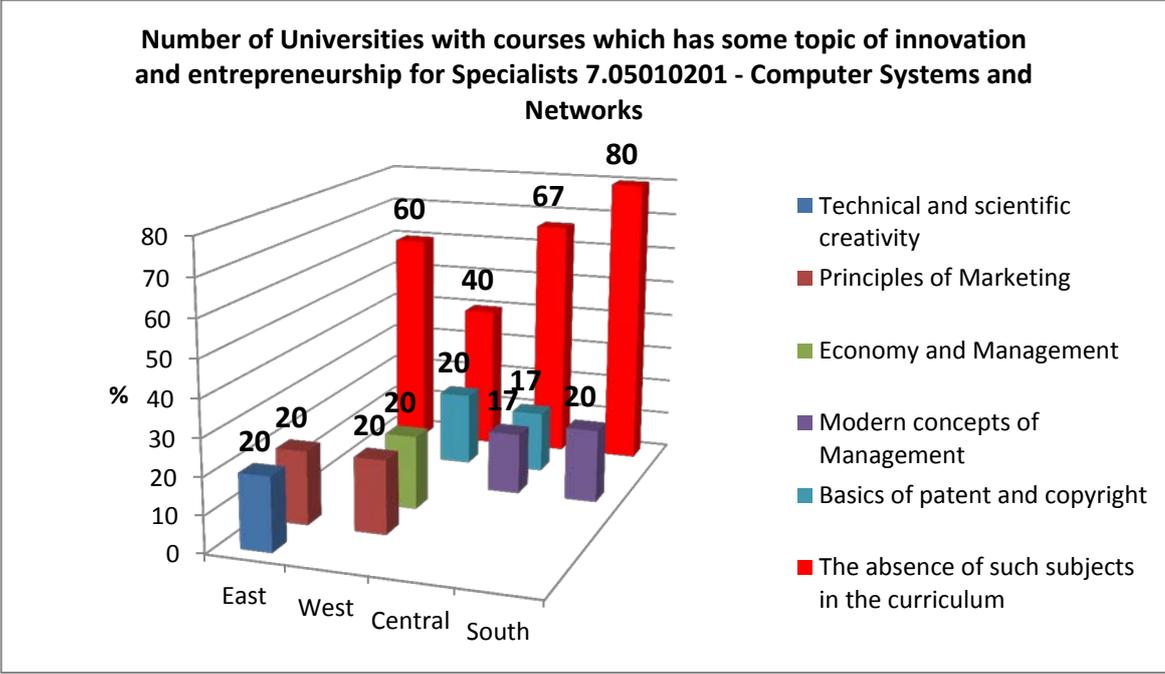


Fig. 16 - Courses dealing with innovation and entrepreneurship for Specialists 7.05010201

Table 17 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010202

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010202 - System Programming	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010202 - System Programming							
	East		West		Central		South	
Region	1	%	1	%	5	%		%
Patent engineering and copyright	1	33			1	20		
Fundamentals of Entrepreneurship					1	20		
Modern concepts of management					1	20		
Principles of Marketing	1	33	1	100				
Economy and management			1	100				
The absence of such subjects in the curriculum	1	33			2	40		

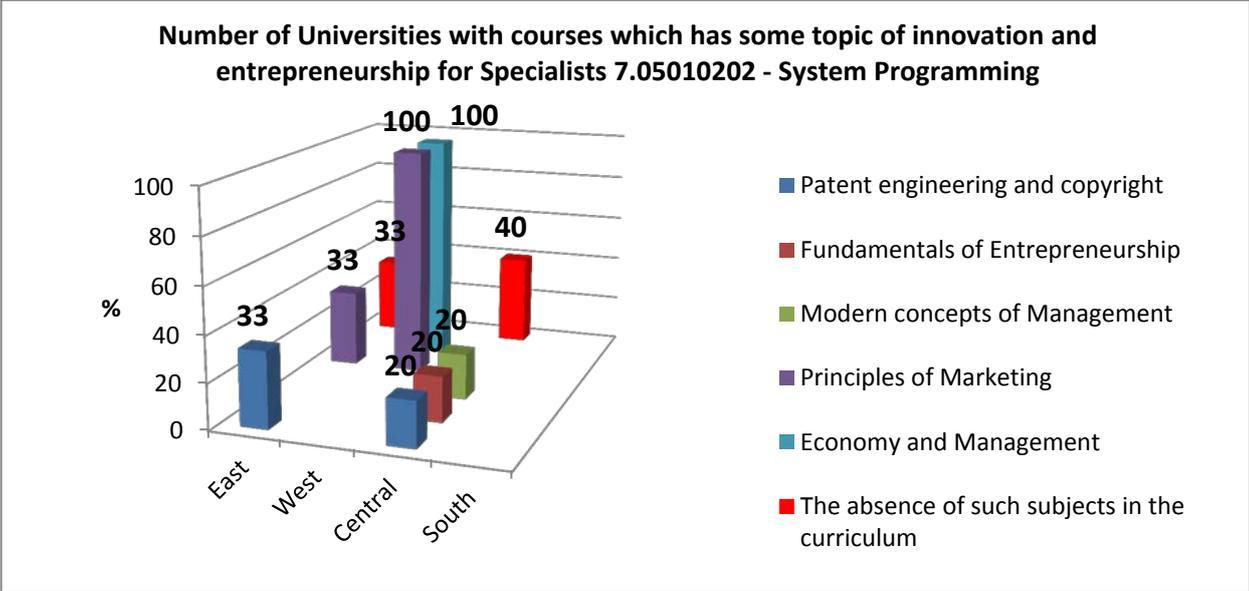


Fig. 17 – Courses dealing with innovation and entrepreneurship for Specialists 7.05010202

Table 18 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010203 - Specialized Computer Systems

Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010203 - Specialized Computer Systems	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.05010203 - Specialized Computer Systems							
	East		West		Central		South	
Region	4	%	1	%	4	%	3	%
Fundamentals of Entrepreneurship					1	25		
Principles of Marketing	1	25	1	100				
Economy and Management			1	100				
The absence of such subjects in the curriculum	3	75			3	75	3	100

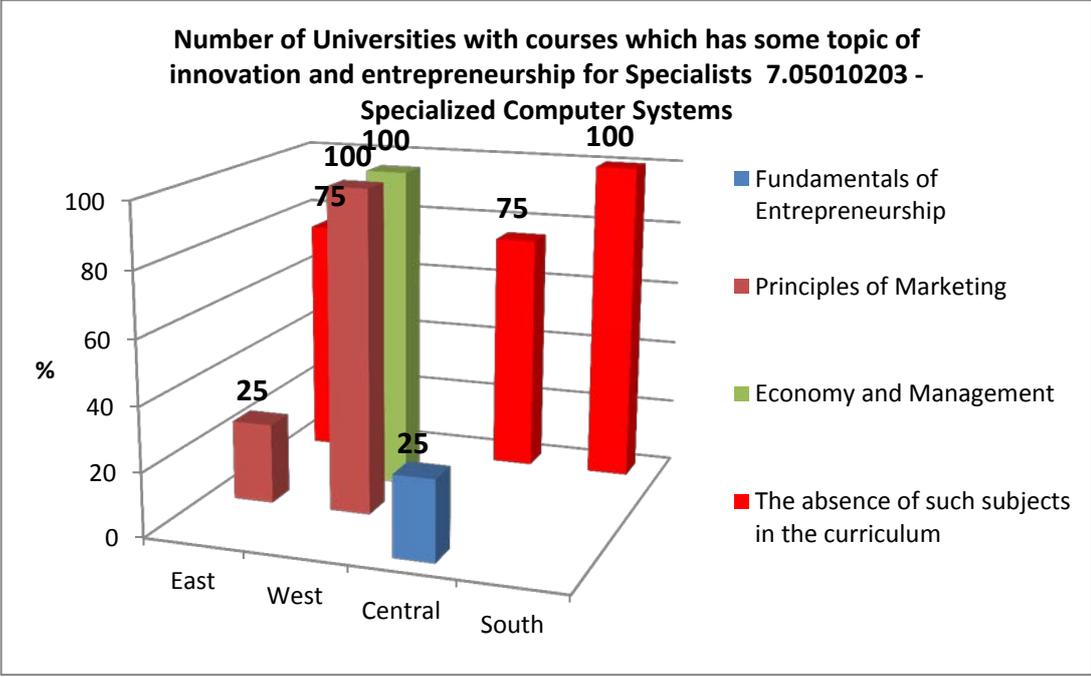


Fig. 18 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.05010202 Specialized Computer Systems

Table19 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.17010101 - Information Security and Communication Systems

Disciplines dealing with innovation and entrepreneurship for Specialists 7.17010101 - Information Security and Communication Systems	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.17010101 - Information Security and Communication Systems							
	East		West		Central		South	
Region	4	%	1	%	4	%		%
Basic scientific research (methodology and organization of science)					2	50		
Principles of Marketing			1	100	1	25		
Economy and Management			1	100				
The absence of such subjects in the curriculum	4	100			1	25		

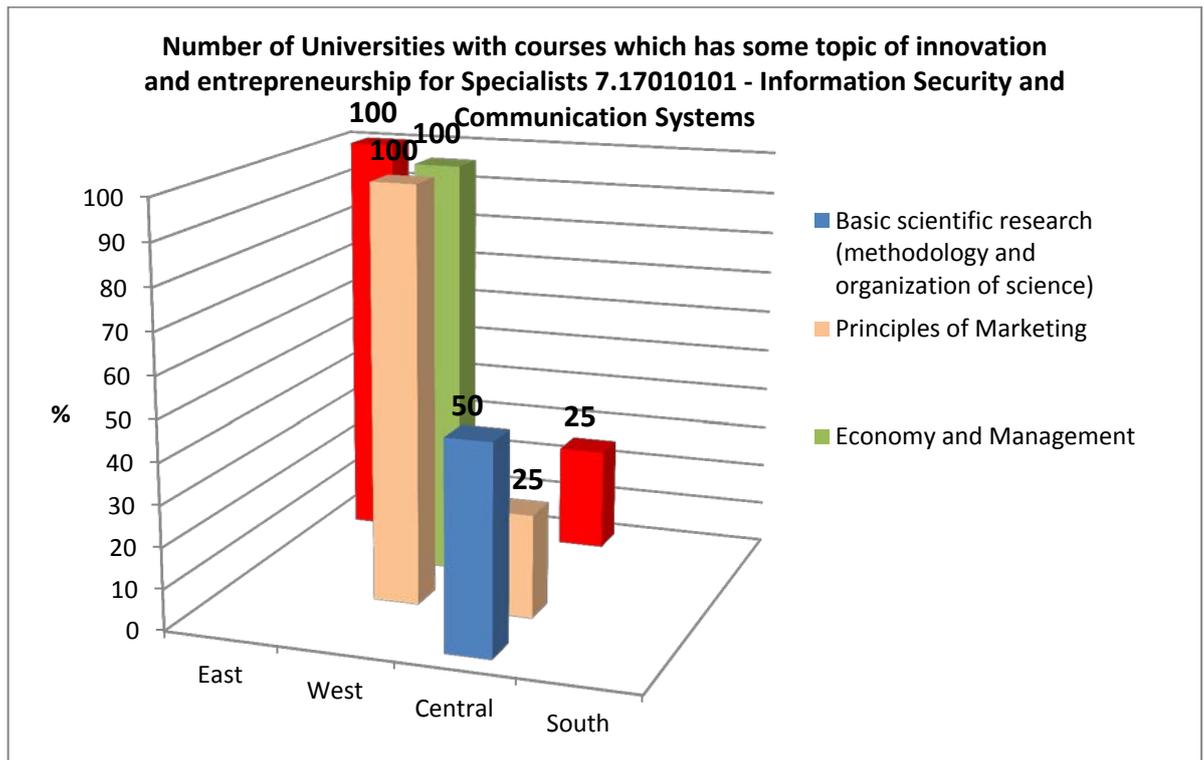


Fig. 19 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.17010101 - Information Security and Communication Systems

Table 20 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030101 - Applied Mathematics

Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030101 - Applied Mathematics	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.04030101 - Applied Mathematics							
	East		West		Central		South	
Region	5	%	6	%	6	%	2	%
Basic scientific research (methodology and organization of science)					1	17	2	100
Economics and organization production of software	1	20						
Creation and commercialization of intellectual property					1	17		
The absence of such subjects in the curriculum	4	80	6	100	4	67		

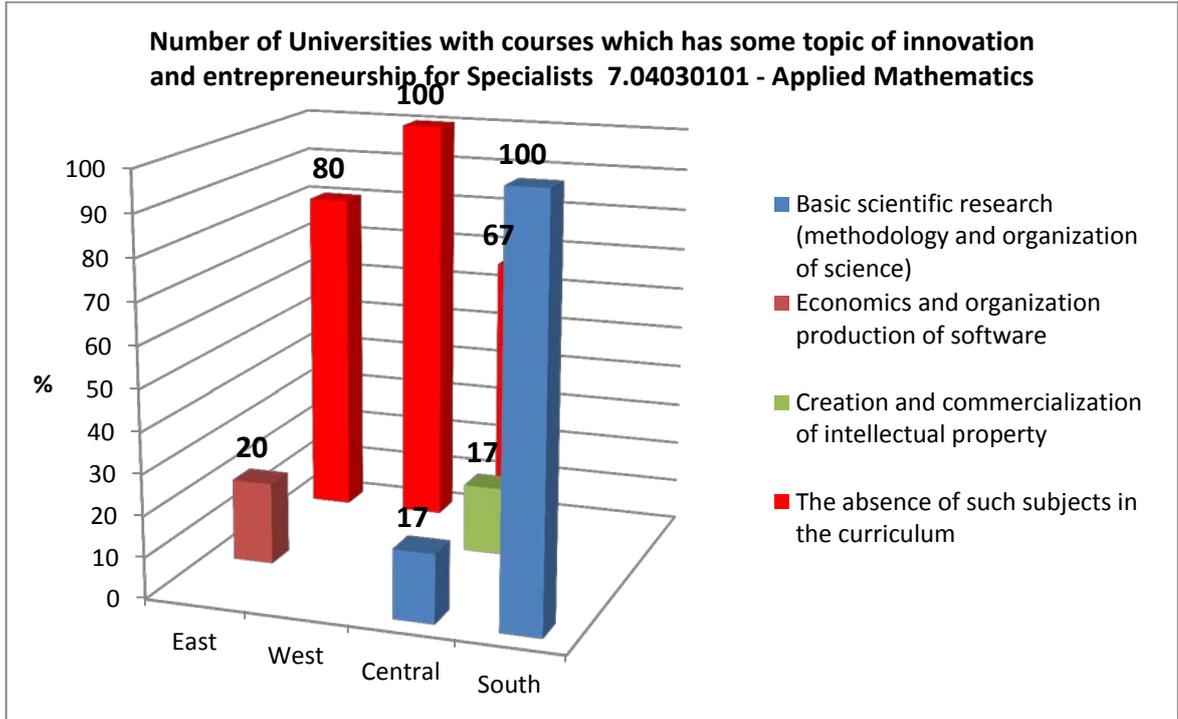


Fig. 20 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030101 - Applied Mathematics

Table 21 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030103 -Mathematical and Computer Modeling

Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030103 - Mathematical and Computer Modeling	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.04030103 - Mathematical and Computer Modeling							
	East		West		Central		South	
Region		%		%	1	%		%
Methodology for industrial software development and intellectual property					1	100		

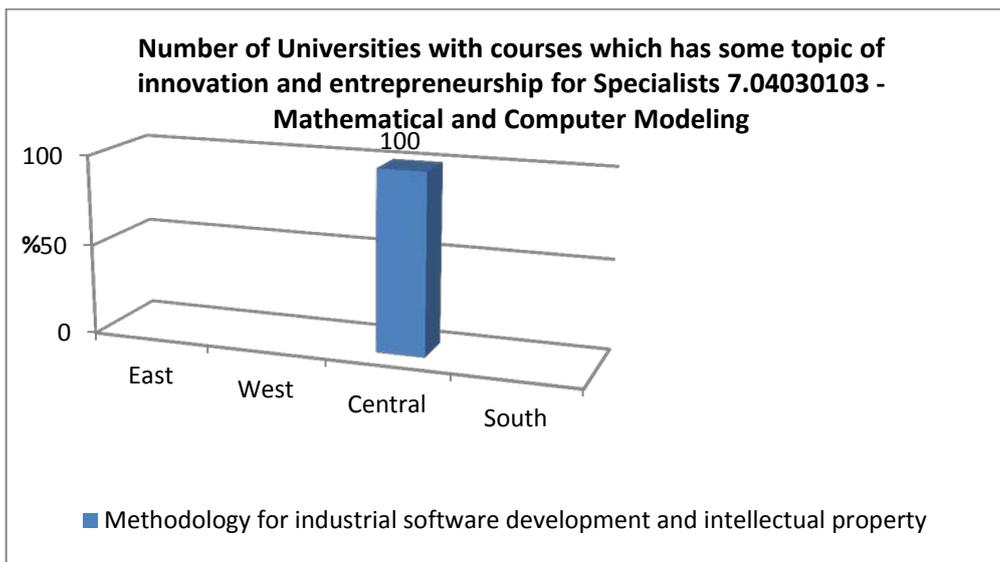


Fig. 21 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030101 - Applied Mathematics

Table 22 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030201 - Informatics

Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030201 - Informatics	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.04030201 - Informatics							
	East		West		Central		South	
Region	7	%	7	%	5	%	5	%
Management in Education			1	14				
Economics and organization production of software	1	14						
Innovative technology training							1	20
Basic scientific research (methodology and organization of science)			1	14	1	20	2	40
The absence of such subjects in the curriculum	6	86	5	71	4	80	2	40

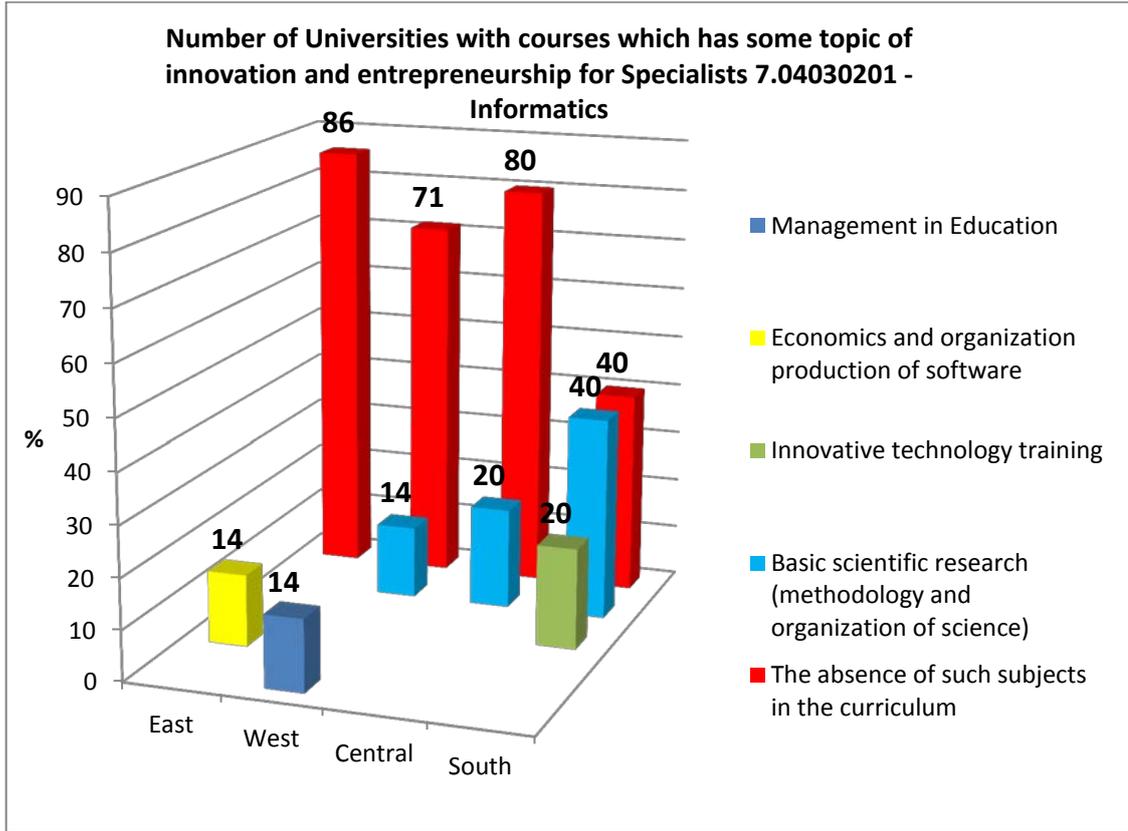
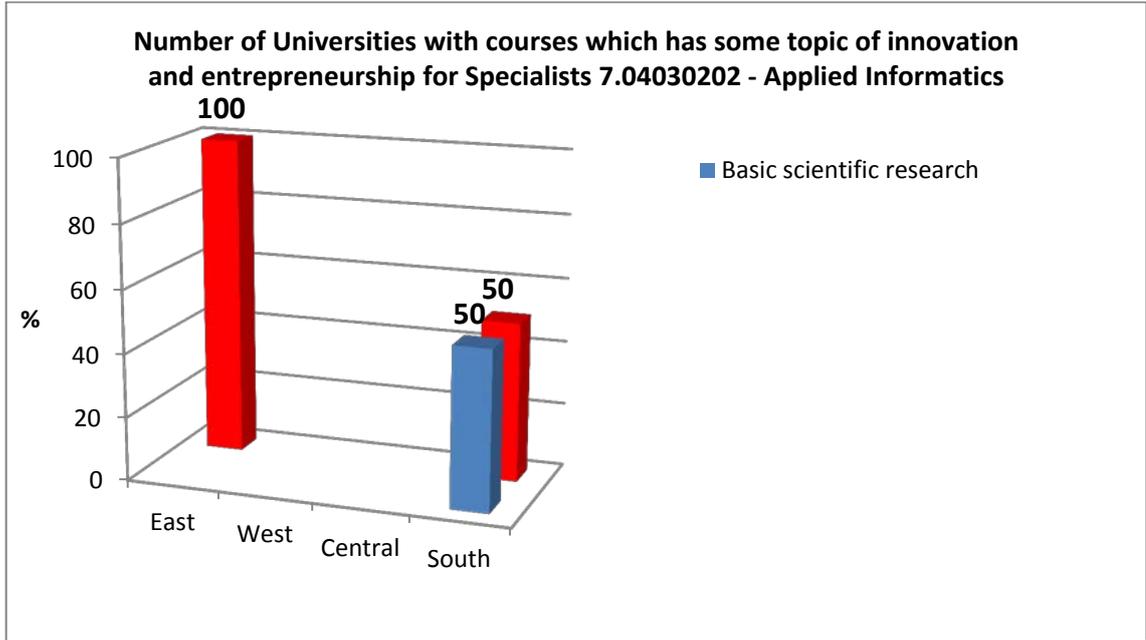


Fig. 22 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030201 - Informatics

Table 23 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030202 - Applied Informatics

Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030202 - Applied Informatics	Number of Universities with courses which has some topic of innovation and entrepreneurship for Specialists 7.04030202 - Applied Informatics							
	East		West		Central		South	
	1	%	1	%	1	%	2	%
Basic scientific research							1	50
The absence of such subjects in the curriculum	1	100					1	50



**Fig. 23 - Disciplines dealing with innovation and entrepreneurship for Specialists 7.04030202 - Applied Informatics**

Analysis of course availability in the curricula for masters which provides students with gaining knowledge and skills in innovation and entrepreneurship given in Charts 24 -36.

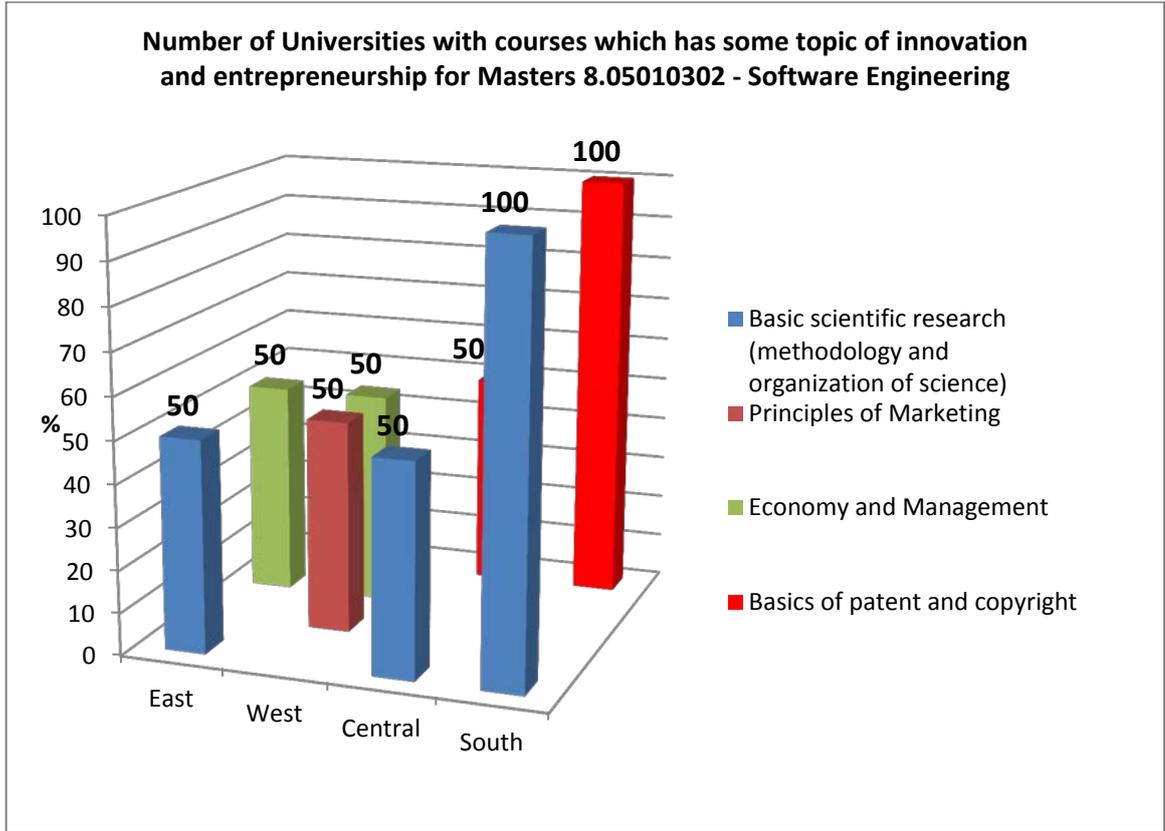


Fig. 24 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010302 - Software Engineering

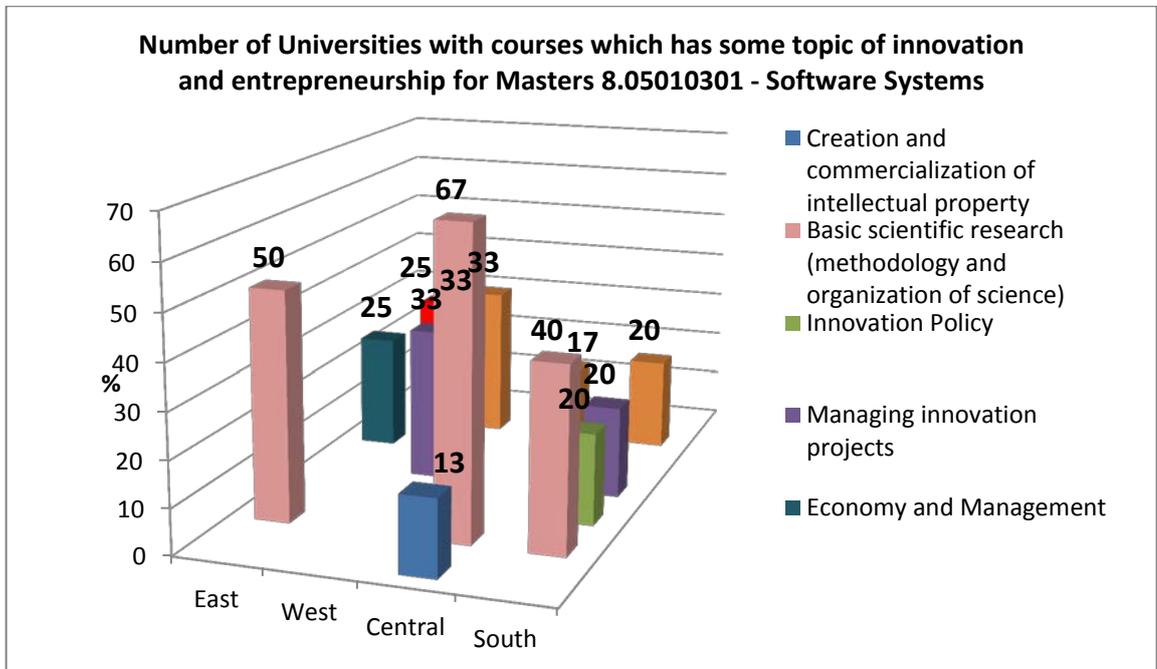


Fig. 25 - Disciplines dealing with innovation and entrepreneurship for Masters 7.05010301 - Software Systems

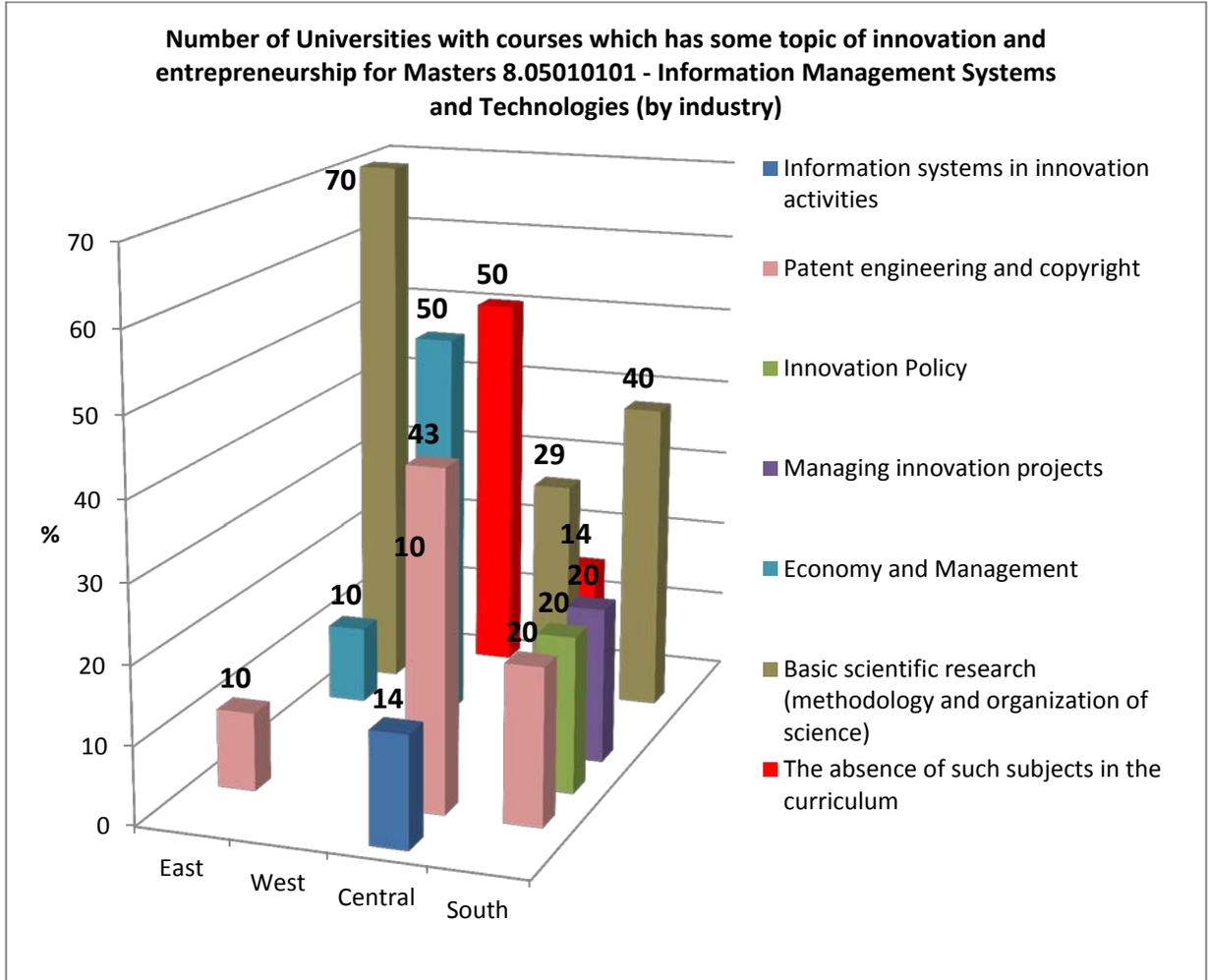


Fig. 26 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010101 - Information Management Systems and Technologies (by industry)

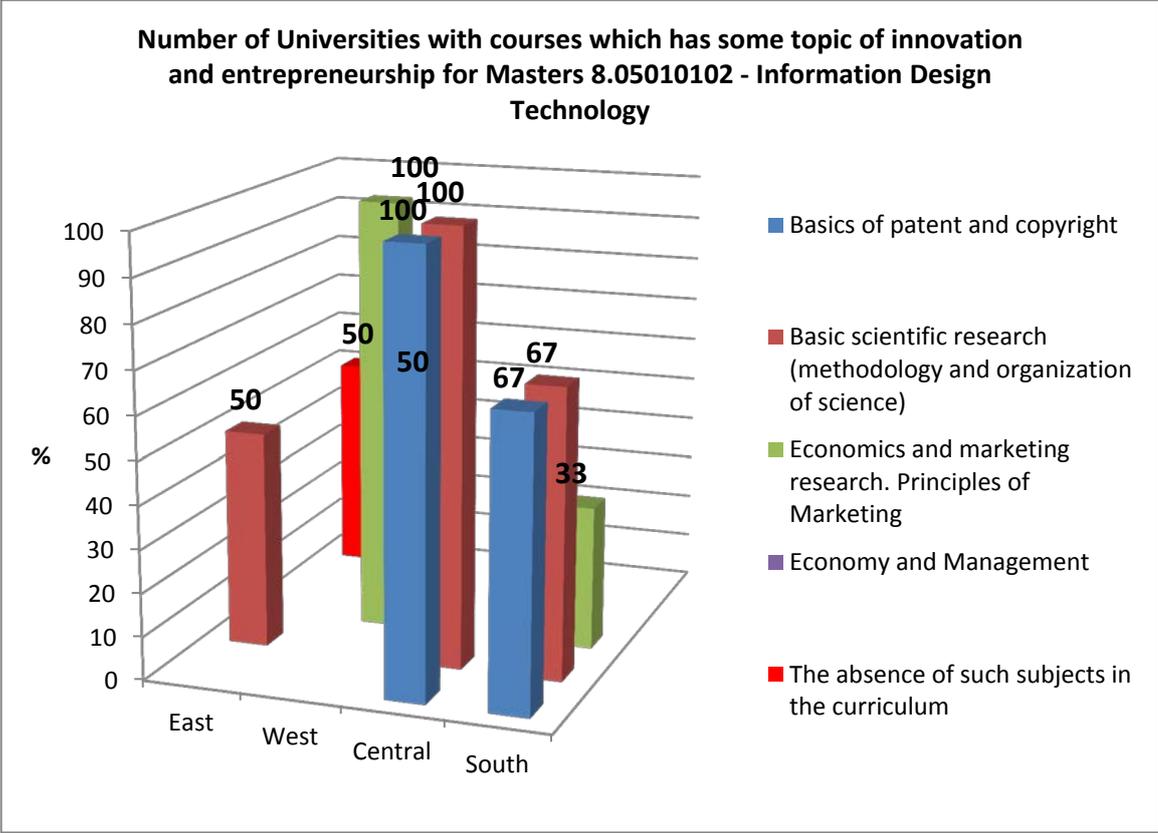


Fig. 27 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010102 - Information Design Technology

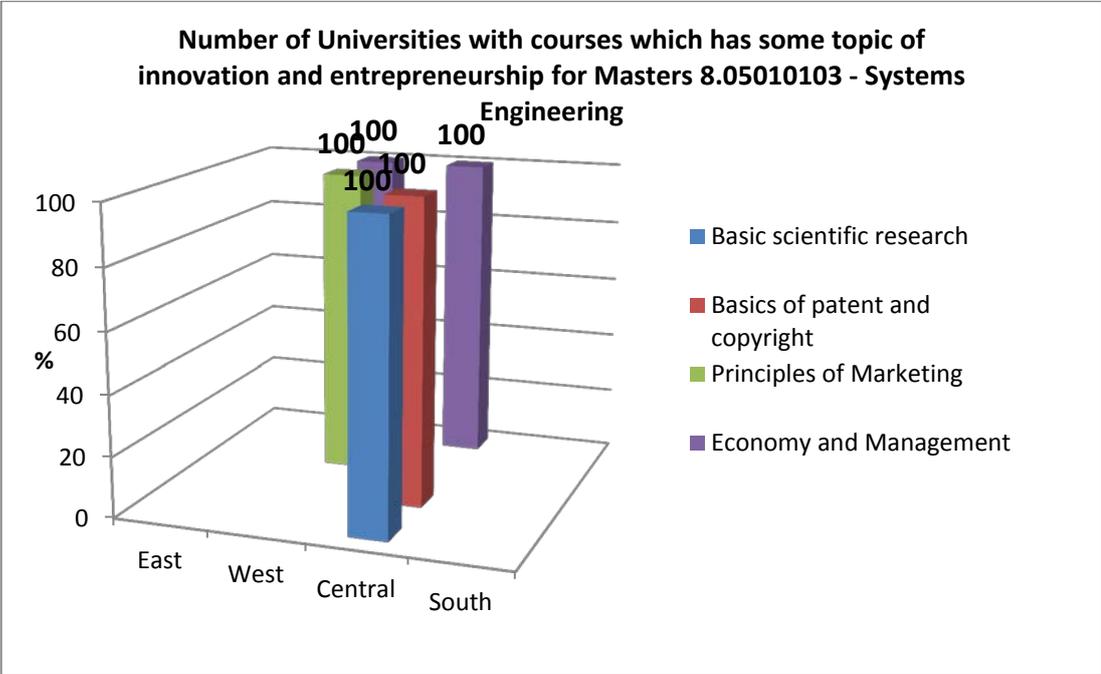


Fig. 28 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010103 - Systems Engineering

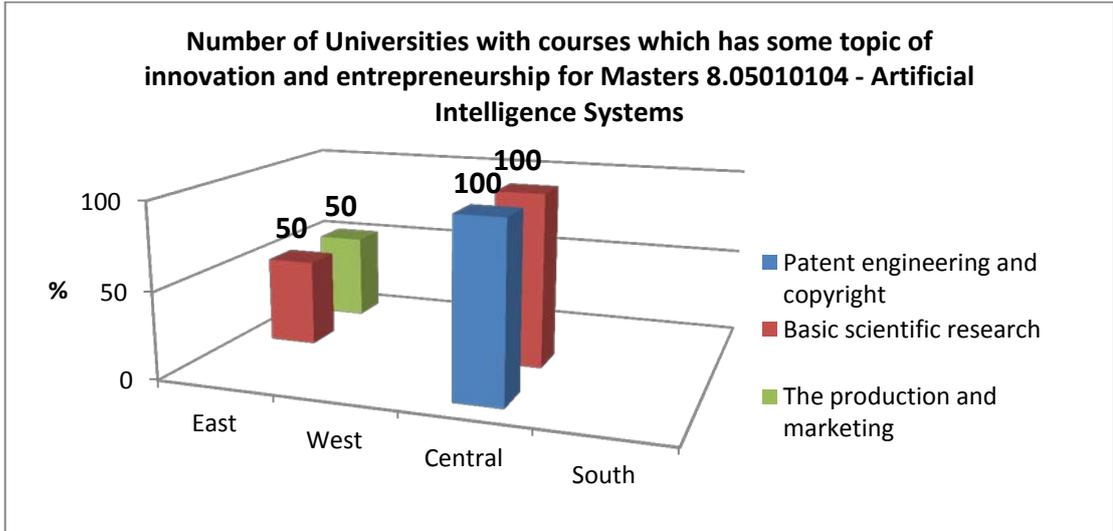


Fig.29 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010104 - Artificial Intelligence Systems

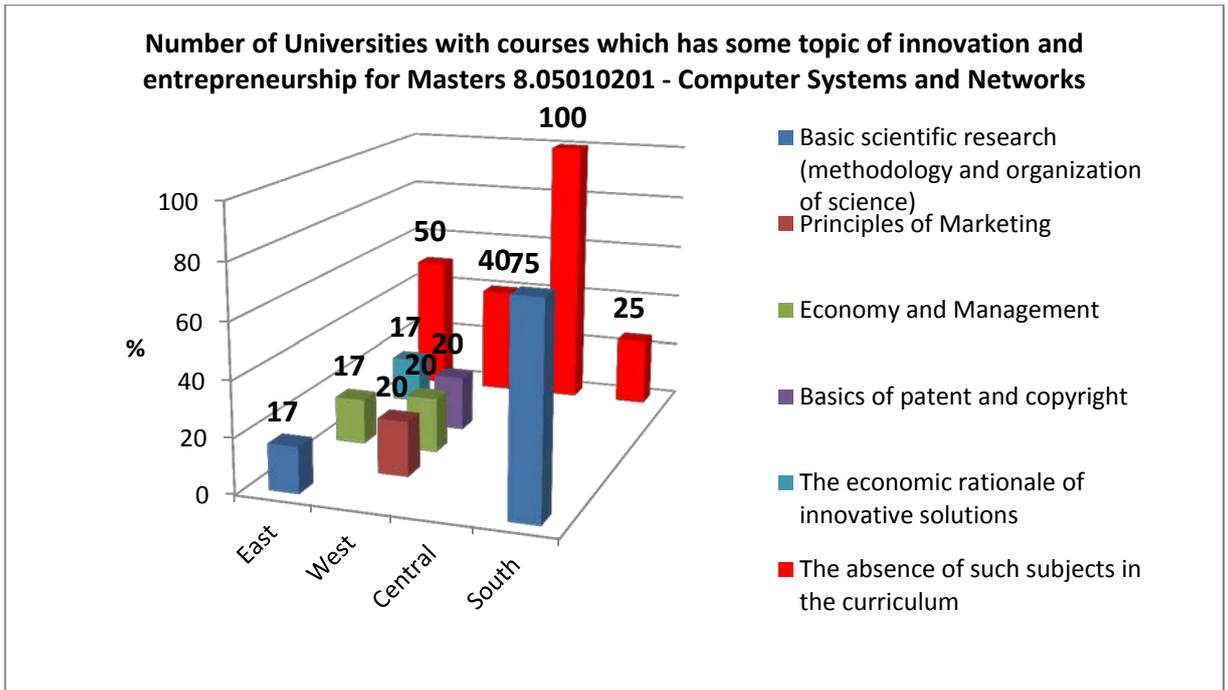


Fig.30 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010201 - Computer Systems and Networks

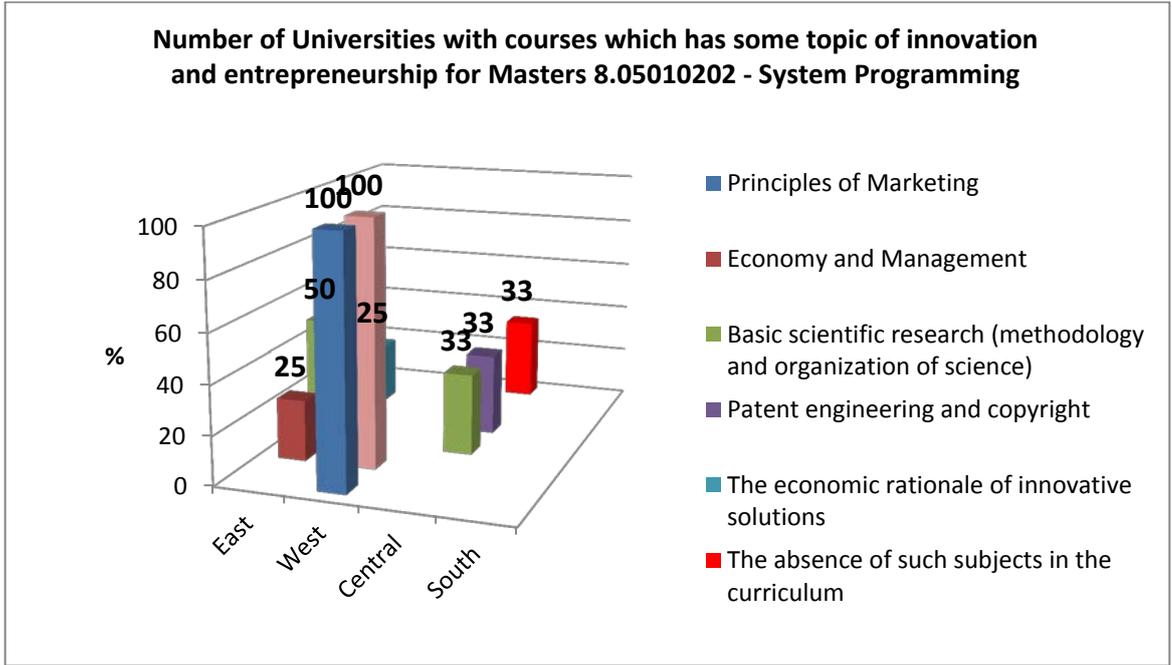


Fig. 31 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010202 - System Programming

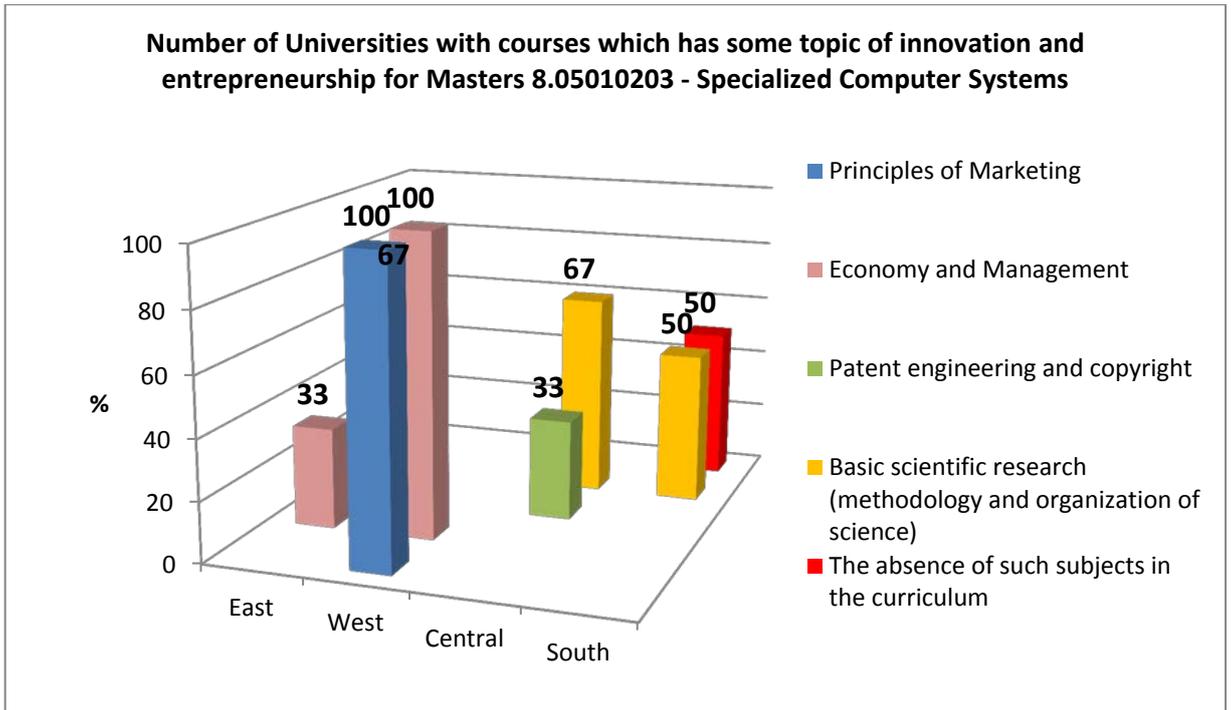


Fig. 32 - Disciplines dealing with innovation and entrepreneurship for Masters 8.05010203 - Specialized Computer Systems

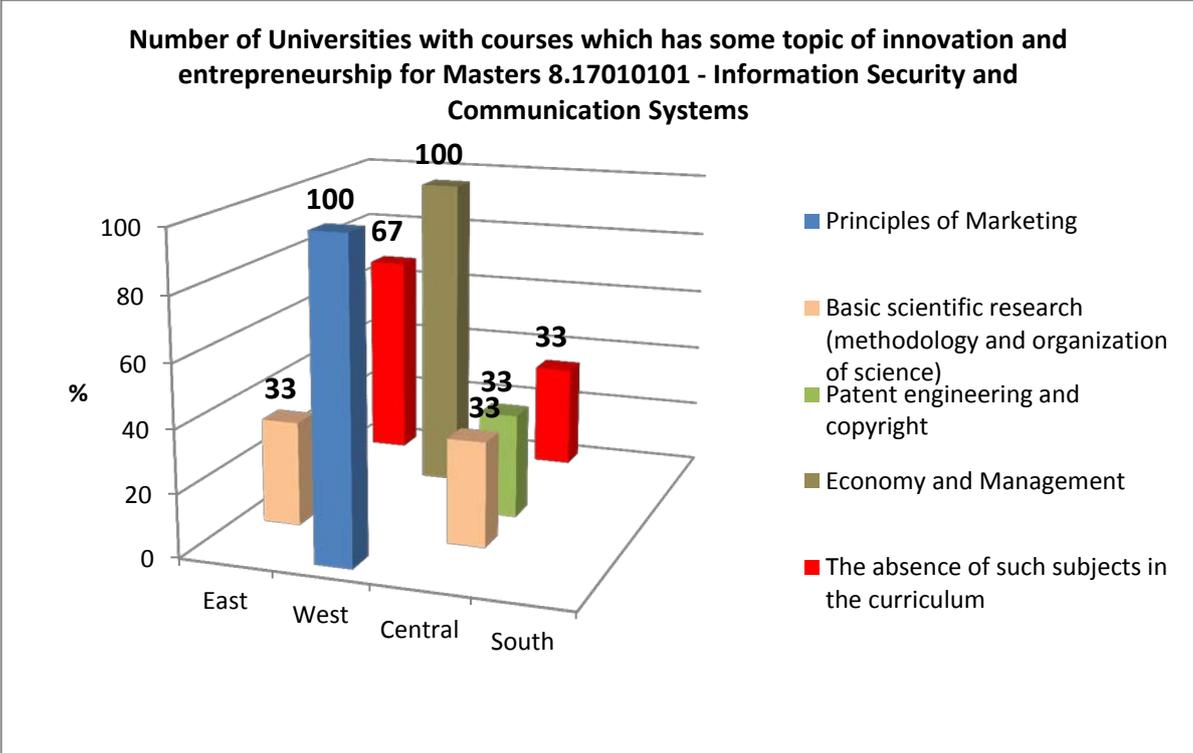


Fig. 33 - Disciplines dealing with innovation and entrepreneurship for Masters 8.17010101 - Information Security and Communication Systems

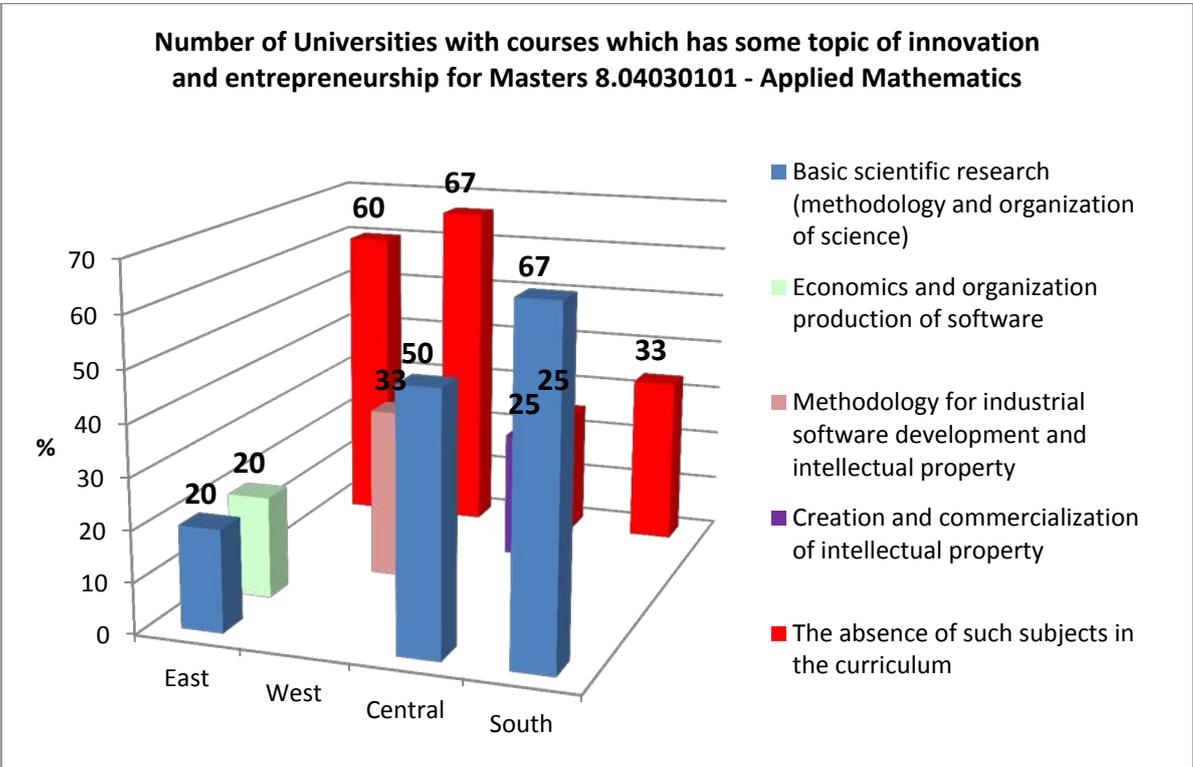


Fig. 34 - Disciplines dealing with innovation and entrepreneurship for Masters 8.04030101 - Applied Mathematics

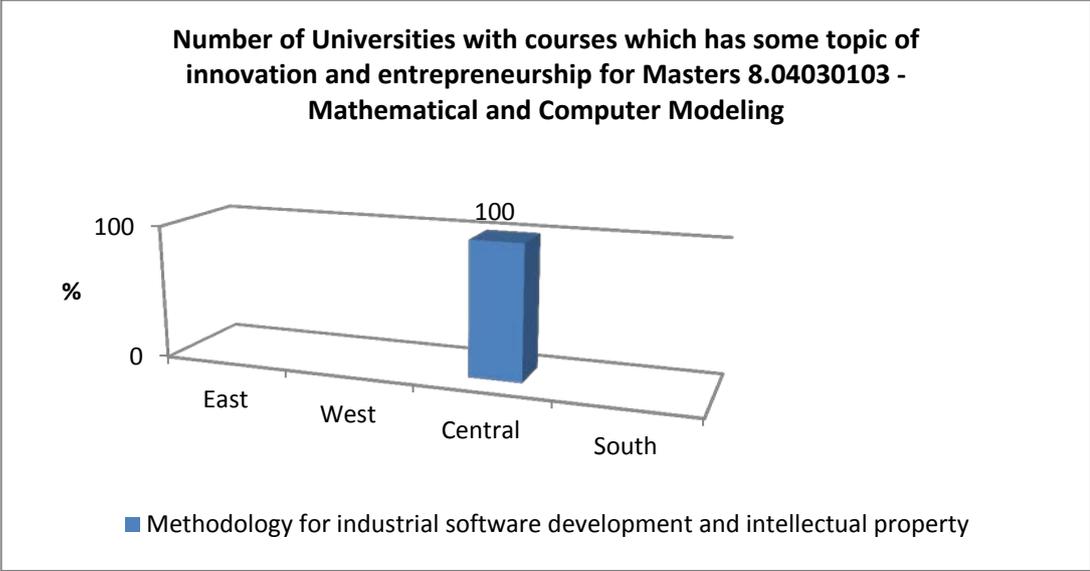


Fig. 35 - Disciplines dealing with innovation and entrepreneurship for Masters 8.04030103 -Mathematical and Computer Modeling

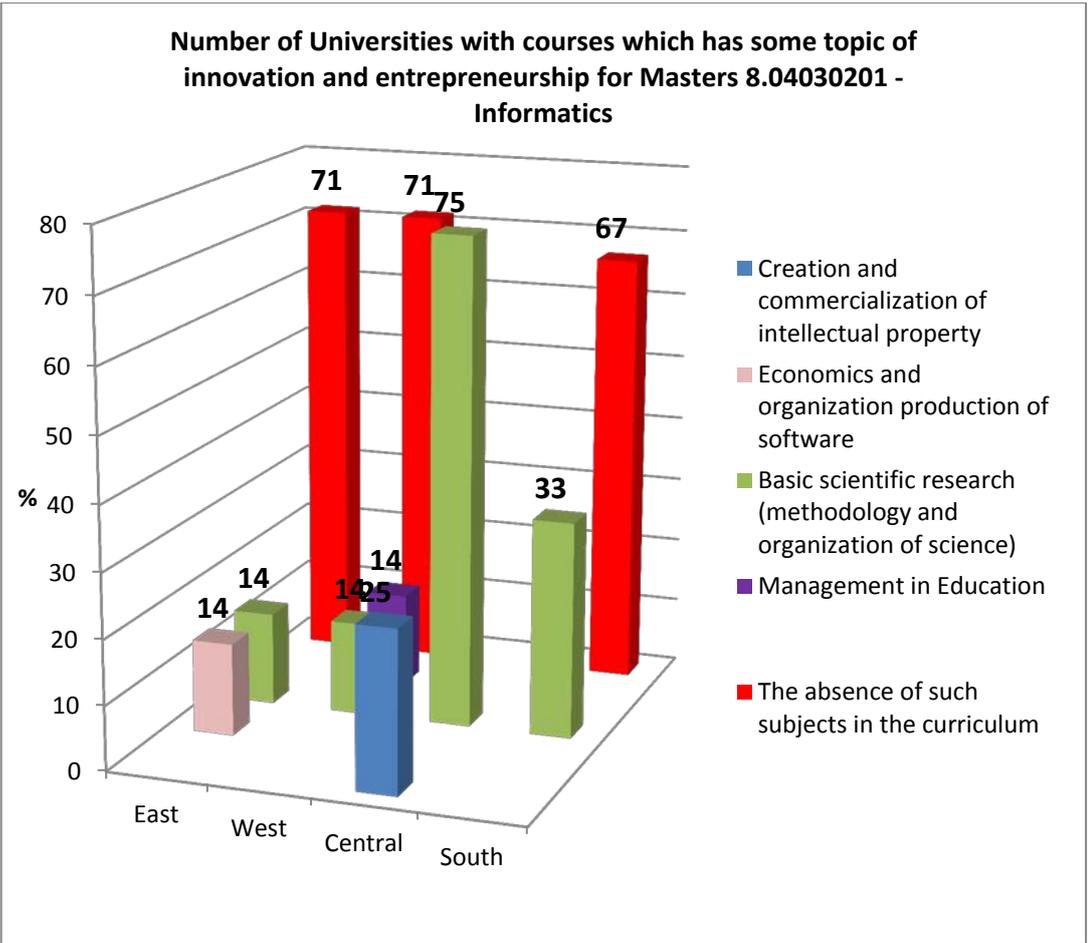


Fig. 36 - Disciplines dealing with innovation and entrepreneurship for Masters 8.04030201 - Informatics

## 2.4 Analysis of Higher Education Institutions which carry out training in specialty 8.18010012 "Innovation management" in Ukraine

According to the information shown Fig. 37, 14 universities (which is 14.4% of 97 Universities which train IT professionals) train masters in program 8.18010012 "Innovation Management".

Three universities are located in Donetsk, which makes 22% of 14 Donetsk Universities that deliver training in specialty 8.18010012 "Innovation Management

Two universities are located in Lviv and Kharkiv, which makes 14,5% of 14 Universities that deliver training in specialty 8.18010012 "Innovation Management.

Thus, the distribution of universities that train in specialty 8.18010012 "Innovation Management" in the regions is the following (Table38, Fig.38):

- in the eastern region there are 7 universities which is 50% of 14 Universities that train in specialty 8.18010012 "Innovation Management";
- in the central region there are 3 universities which is 22% of 14 Universities that train in specialty 8.18010012 "Innovation Management";
- in the western and southern region there are 2 universities in each region which is 14% of 14 Universities that train in specialty 8.18010012 "Innovation Management".

Table 37 - Number of Universities that deliver training in specialty 8.18010012

City	Number of Universities that deliver training in specialty 8.18010012 "Innovation management" in the cities of Ukraine
Dnipropetrovsk	1
Donetsk	3
Luhansk	1
Kharkiv	2
Lviv	2
Kyiv	1
Sumy	1
Khmelnyskyi	1
Crimea	1
Odessa	1
<b>Total</b>	<b>14</b>

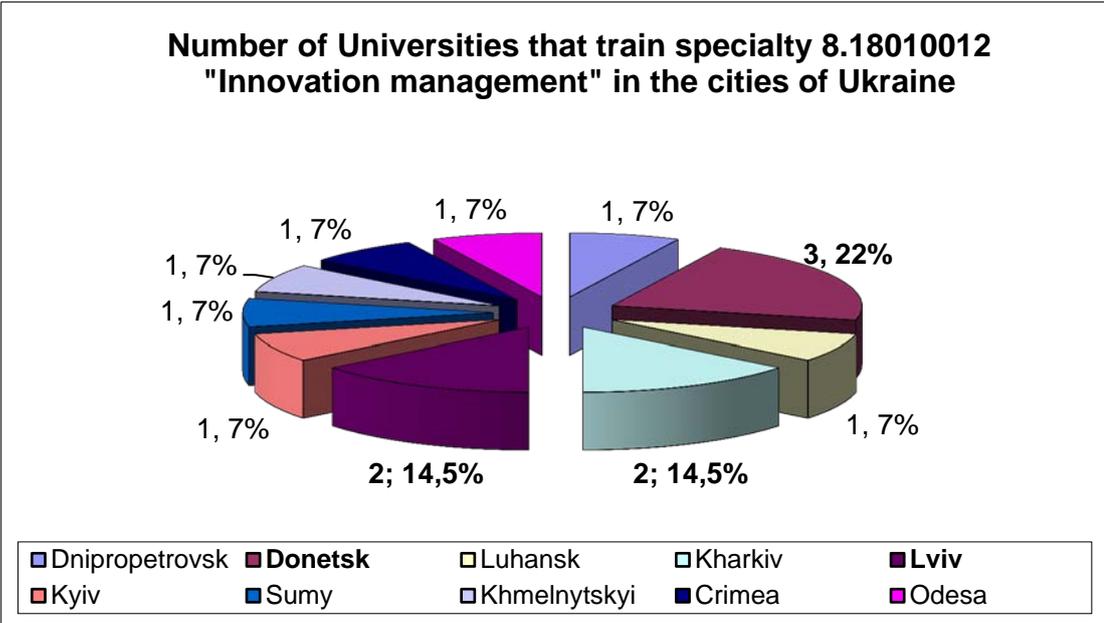


Fig. 37 - Number of Universities that deliver training in specialty "Innovation Management"

Table 38 - Number of Universities that train specialty 8.18010012 "Innovation management" in the regions of Ukraine

Region	Number of Universities that train specialty 8.18010012 "Innovation management" in the regions of Ukraine
East	7
West	2
Central	3
South	2
<b>Total</b>	<b>14</b>

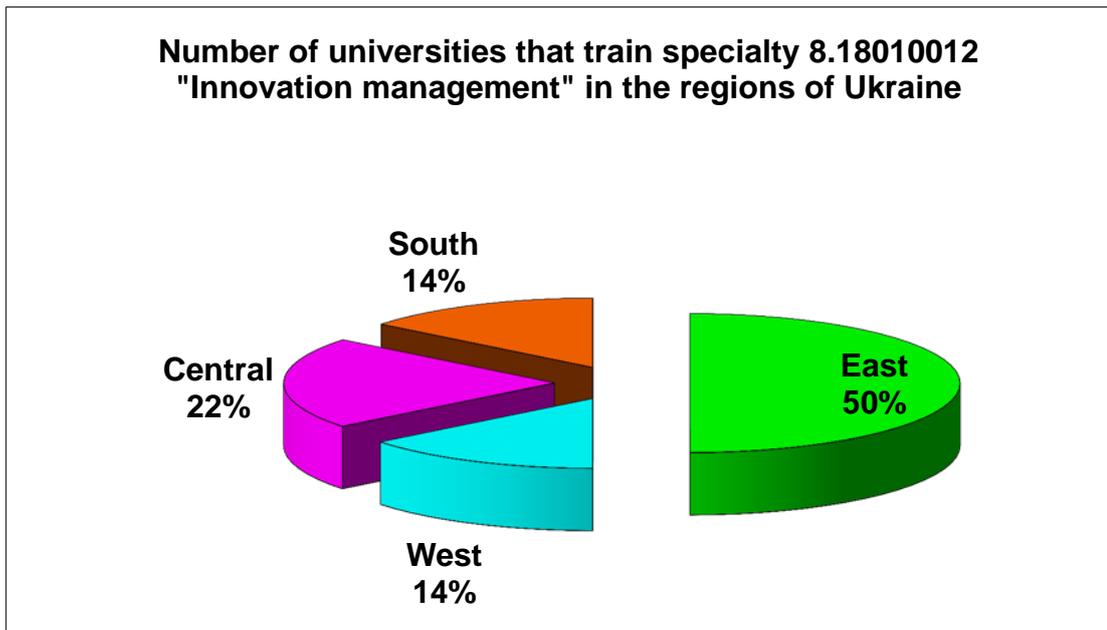


Fig. 38 - Number of Universities that train specialty 8.18010012 "Innovation management" in the regions of Ukraine

## Chapter 2 Conclusions

1. At universities that train bachelors for IT industry, the disciplines dealing with innovation and entrepreneurship were not found in the curricula. If the curricula contain economic subjects, then the issues of innovation and entrepreneurship take up to 0.5 -2 hours of the total class time, which is obviously not enough.

2. While training specialists for IT industry, only 2 of the 97 universities (2%) have disciplines that according to working programs fully cover the issues of innovation and entrepreneurship in the curricula for specialties 7.05010301 - Software Systems and 7.05010101 - Information Management Systems and Technologies. At other universities this issue is a part of economic courses.

3. While training masters for IT industry, only 5 of the 97 universities (5%) have disciplines that according to working programs fully cover the issues of innovation and entrepreneurship in the curricula for specialties 8.05010301 - Software Systems and 8.05010101 - Information Management Systems and Technologies. At other universities this issue is a part of economic courses.

It should be noted that 3 universities are in Kiev (the central region), 1 university is in Berdyansk (the southern region), 1 university is in Donetsk (the eastern region).

At universities in the western region the disciplines dealing with innovation and entrepreneurship were not found in the curricula.

4. Only 14 universities, which makes 14.4%, deliver master training in specialty 8.18010012 "Innovation management". This is a modest figure as far as innovation training is concerned.

CHAPTER 3

ANALYSIS OF UNIVERSITY SURVEY OF INNOVATION AND ENTREPRENEURSHIP POWER OF UKRAINE UNIVERSITIES

For a complete analysis of innovation and entrepreneurship in universities in Ukraine was developed a surveys for universities with bachelors and masters programs in IT. University was proposed questionnaire with a list of questions (Appendix B), which were analyzed.

On the 1st question of survey (Appendix B) representatives from 97 Ukrainian universities responded like:

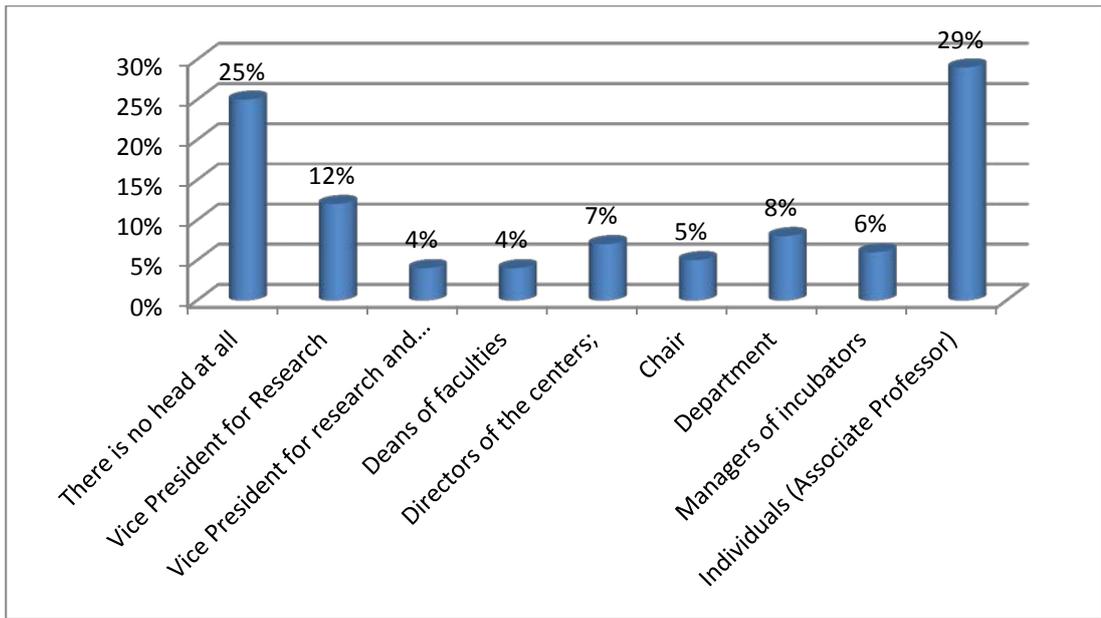


Fig.39 – Does University have key person responsible for innovations and entrepreneurship activities

Among the key persons who could make strategic decisions at universities are only - 35%.

On the second question (Does Universities have a special unit that organizes innovation and entrepreneurship activities among students?) answers were distributed as follows:

35% - does not have any units that are engaged in such activities;

16% - have departments whose functions directly related work on the organization of innovation and entrepreneurship students;

8.5% - indicated units are divisions of intellectual property;

11.5% - reported units whose functions do not include work on the organization of innovation and entrepreneurship students;

4% - indicated as such subdivision Student Society;

3% - plan to establish such units in 2013;

22% - reported other units that do not have any relation to such activities.

Thus, less than 25% of universities have or only planning to have such units.

Universities mentioned such names of existing units engaged in such activities: Business – incubator, Incubator innovative ideas, Center project development, Center for Innovation Development, Student Innovation Business Incubator, Techno – incubator, center of innovation, commercialization and entrepreneurship.

Departments of intellectual property usually deals with the preparation of the necessary documentation, registration of the public administration, issues of accountability and support in the active state patents and certificates.

The third question (What kind of student's activities in the field of innovation and entrepreneurship are in your high school?):

5% did not specify any form of promotion of innovative and entrepreneurial activities;

32% indicated forms of activation that are not related to innovation and entrepreneurship.

Below are listed the main forms of student's activities (listed in decreasing order of their frequency):

involvement of students in research;

involving students in real projects in companies during practice;

training workshops, master classes;

individual counseling professionals with real business;

- business ideas contests;
- preparation business ideas for finding investors for projects;
- participate in scientific conferences;
- participation in national and international competitions;
- awarding the most active students;
- Work Student Research Council or similar body;
- innovative orientation tasks for the course and diploma projects;
- scientific work groups, design bureaus.

Less than 10% of 97 university respondents indicated the following forms of activities:

- establish interdisciplinary ties in the performance of the design;
- Initial introduction of new disciplines in the curricula;
- conducting classes in the form of "brainstorming", "game design";
- measures to promote student autonomy and group work;
- formation of a unified information space;
- additional benefits to enroll in graduate and postgraduate studies;
- participation in international projects Tempus.

Question 4: (Thought your experts about what is knowledge and skills of entrepreneurship and innovation should receive students during study?) Lists the knowledge and skills of the frequency of their mention in the responses:

The student should know:

- the organizational forms of business, establishment of businesses;
- essence, structure and plan of business projects development;
- patterns of functioning of the economic mechanism inside the enterprise;
- essence and peculiarities of the formation of the investment business;
- innovation and investment company infrastructure;
- pricing products and services;
- pricing factors and pricing methods;
- methodology and techniques of developing innovative investment projects;
- essence and methods of evaluation of technology transfer;
- methods of innovative thinking;
- international and national patent systems.

- state innovation policy;
- risks theory in implementing innovative projects.

The student should be able to:

- plan and organize a new product;
- highlight innovative components of the business;
- justify funding innovation;
- identify ways to improve innovation;
- evaluate the effectiveness of social innovation;
- perform collection, processing, analysis, systematization of scientific, technological and innovation information, synthesize advanced domestic and foreign experience;
- protect intellectual property created by the software;
- develop a business plan;
- assess the potential market;

In less than 5% of the respondents answers indicated the following knowledge and skills:

- fluent English;
- availability of leadership;
- knowledge of information security;
- knowledge of international law and copyright for software.

Question 5 (Which companies and organizations are working with your university?).

Responses were as follows:

- 3% did not provide any information about companies and organizations collaborating with universities;
- 67% reported about local companies and organizations;
- 35% reported about international companies and organizations;
- 26% mentioned government organizations;
- 52% indicated companies and organizations which are major employers for their students.

Only 15% of universities reported companies and organizations whose activities are directly related to innovation.

Question 6 (How Universities deals with intellectual property of student's innovative products?)

- 2% universities did not provide any information about intellectual property in universities;
- 75% universities indicated that they don't make an additional agreements with students concerning intellectual property of student's innovative products;
- 18% universities indicated that they provides payment of royalties of intellectual property;
- Other universities which have specific departments provided information about activities of protection of intellectual property and mechanisms for registration of intellectual property.

Question 7 (What innovative products were created in your universities by IT - students?)

- 30% universities indicated that they do not have innovative products created by students;
- 23% universities reported about their products which is not innovative;
- 47% universities reported about their innovative products related to university activities (website, workflow, automation activities, development of e-learning courses).

Below are some examples of the most interesting and innovative student's products:

- the game for the mobile platform Android. The application allows you to install features in the style of the game, view 3D match of your team, play football matches;
- GSM-logger that is designed to obtain current data from devices across the channel GSM cellular telephone or online;
- electronic voting system Mobile-RADA. Electronic voting system designed to automate the work of deputies during the sessions with the tablet computer;
- software and hardware management emergency medical care;

- software monitoring and recording interactions with the media center to promote the MES of Ukraine.
- the traffic monitoring;
- electronic system to check for plagiarism;
- the system of care for pregnant women for monitoring vital parameters of health for early detection and response bias.

Question 8 (Does university have startups created by students?).

- 45% universities indicated that they don't have startups created by students;
- 15% universities indicated the projects which cannot be considered as startups;
- 15% universities indicated that the projects were created using university funds;
- 25% universities indicated that startups projects created using personal funds.

All universities were asked to provide a web-links to the startup projects. None of the startup websites is not specified as created by university students or with the help of university students. To specify that the startup project is relevant to the university is very difficult.

Listed below are the some of the most interesting projects:

- <http://wildec.com/> - company specializes in the development of mobile games and applications;
- <http://nrpg.com/ua> - information system of quality control;
- inSTORE - Online shopping area is only available for registered users in Internet service iO2n;
- [www.dyamar.com](http://www.dyamar.com) - products for programs protection from reverse engineering.

### Chapter 3 Conclusions based on survey study

1. In most high schools key persons does not provide adequate attention to the development of student's innovation and entrepreneurship.

2. In most universities innovative work or not involved, or it belongs to the divisions which in its core activities have nothing to do with it.

3. In most universities innovative and entrepreneurial work associated exclusively as research work under the guidance of teachers, not paying attention to the independent student's work development.

4. Ukrainian students actively and successfully participated in various innovative competitions. Among the most common: Ukrainian festival of innovative projects ([www.startup.kpi.ua](http://www.startup.kpi.ua)), [Zavtra.ua](http://Zavtra.ua), Microsoft ImagineCup, «Iron entrepreneur."

5. Universities still paying not enough attention to the implementation of modern innovations in to the learning process (development of unified educational information space, "brainstorming", "game design", interdisciplinary ties).

6. IT students do not getting enough knowledge and skills during their studies.

7. Universities effectively cooperate with both state and international well-known companies in conducting joint activities and training. Unfortunately very small number of universities has connections with innovative structures and investment funds.

8. In high school has a well organized system of intellectual property protection. At present, most universities do not have the actual mechanisms of payment of royalties for the objects of intellectual property. Very small amount of such documents that get students. Estimation of the ratio is one such document for 50 students.

9. Not all universities have completed innovative products that were created with the student's participation. In many cases innovative products creates for own university's needs. Almost none of such innovative products which is known outside of Ukraine.

10. In universities there is no mechanism helping students with startups creating. This is evidenced by the lack of information about student startups in majority of universities.

11. Creating of own companies in most cases carried out by students at their own expense without additional funding from the university or investor.

12. Total number of startups in Ukraine is very low, despite the high educational and scientific potential of its citizens.

#### Recommendations:

1. Each university should clearly identify the person which will be responsible for cooperation with companies in a field of innovations and entrepreneurship among IT - students.

2. Each university should establish an appropriate unit, the main features of which will be work with companies in a field of innovations and entrepreneurship among IT - students. By name and essentially the most suitable are: Center for Innovation, Commercialization and Entrepreneurship, Business Incubator Center. At the state level should be developed Standard Regulations on innovation, commercialization and entrepreneurship for Universities.

3. The best experience of leading universities should be shared among all Ukrainian Universities.

4. At the governmental level for all IT – programs should be developed an typical syllabus for courses such as: "Economics and Business", "Intellectual Property", "Technical and scientific creativity", "Basic scientific research", "Basics of Business", "Management innovative projects. "

5. Should be taken into account the innovative potential of students for Master and PhD programs.

6. Advice mechanism for the protection of intellectual property, which would have provided the payments of royalties to the students should be developed.

## CHAPTER 4

### STATISTICAL ANALYSIS OF STUDENTS' SURVEY CONCERNING THE STATE OF INNOVATIONS AT UKRAINIAN UNIVERSITIES

The survey was conducted at four Ukrainian partner universities: Kharkiv National University of Radioelectronics, Kharkiv, Ukraine; Lviv Polytechnic National University, Lviv, Ukraine; Odessa National Politechnic University, Odessa, Ukraine; Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine, involving the students of all years of educational and professional training level ("bachelor" and "master") of "Software engineering" and "Computer sciences" training courses. The total number of the students completing the survey is 546 persons. Among them there are 83 – the first, 147 - the second, 143 - the third, 128 - the fourth, 38 the fifth and 7 - the sixth-year students respectively. The relative allocation of students according to the year of training is shown in Fig. 40. As it is seen from this Fig. 40, more than 77 % of respondents are the students of the second-fourth years of educational and professional training level ("bachelor") and that is optimal for reliable estimation and allows to trace the dynamics of assessment variations of innovative potential and the impact of external factors on the growth of students' experience.

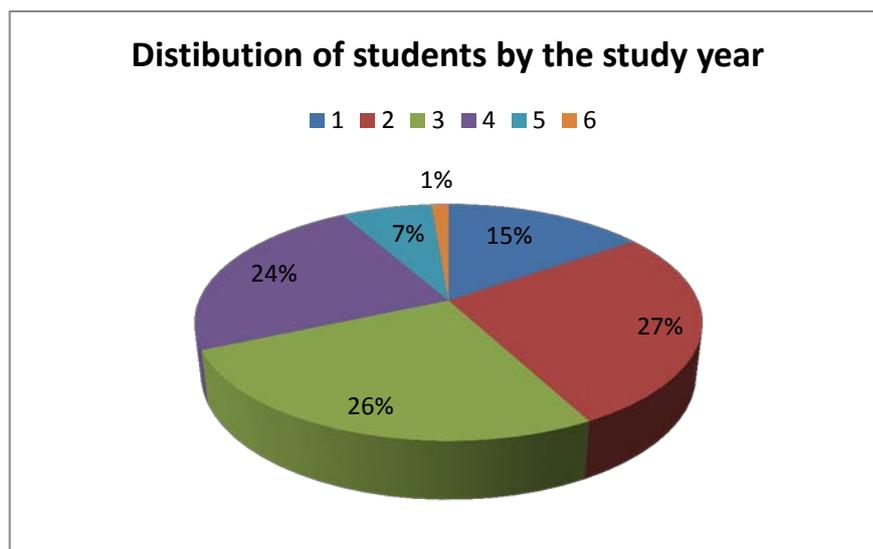


Fig.40 - The distribution of the students completing the survey by the study year

The respondents were asked to answer 15 questions, 14 of which were in a closed form offering 5 response options and one was in an open form to find out if students are aware of the current state of innovation and entrepreneurship in the IT industry sector in Ukraine; in particular, it was expected to obtain a list of IT products made by Ukrainian developers known among the students.

The questions were meaningfully divided into three logical sections - the first of which was to determine the current level of students' interest in the development of entrepreneurship and innovation and to learn about their future work prospects after graduating from university. Thus, more than 89% of the students were sure about applying their skills and knowledge in their future job and only 1.7% said that their future plans are not going to be related to IT industry, and this fact confirms the reliability and validity of the survey results. The questions of the second section of the survey were designed to establish the current level of theoretical and practical training of Ukrainian IT students in the field of entrepreneurship and innovation and to identify the potential "bottlenecks" in IT experts training to ensure that competence. The third section was aimed to establish the level of innovation potential of Ukrainian IT students and identify the major barriers for entrepreneurial activities and creating own IT innovation business in the current context. To a high degree of accuracy the results of this survey allow to establish the main problems in the current state of IT professional training in Ukraine in the field of entrepreneurship and innovation and to concentrate the efforts of the project on eliminating these difficulties and further development of the innovation potential of Ukrainian IT industries.

The survey contained two questions to study the students' plans as for the development of their own IT business and creating innovative products: " Are you planning to set up your own IT related business?" and " Are you planning to create your own software product or solution in future for being implemented by an investor?". The general statistics of the answers to these questions is presented in Fig.41.

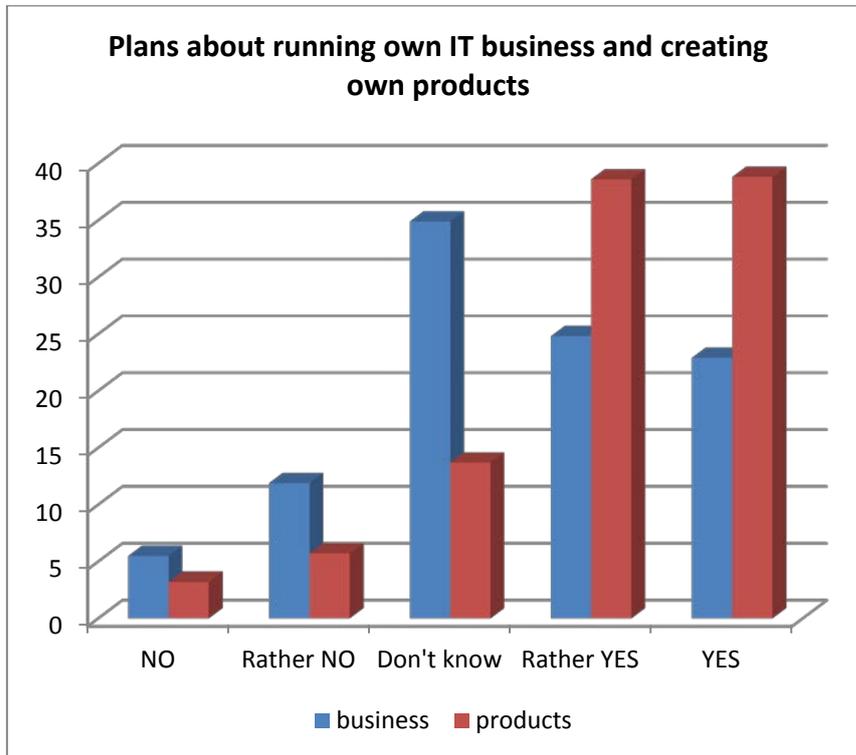


Fig. 41 - Chart of respondents' answers about their entrepreneurial and innovative plans

Fig. 41 clearly shows that despite the fact that a significant number of students had some hesitations as to the answer to the question about setting up their own business (the most common answer was - "I don't know"), then as for the intention to create and commercialize their own innovative products most of the respondents give positive answers. Despite the hesitation about setting up their own IT business, Fig. 41 shows the distinct tendency towards more like positive than negative answers to this question (47.7% responses are "rather yes" and "yes").

Fig. 41 and Fig. 42 show the percentage distribution of the answers to these two questions against the grade level for the students of the second-fourth years of study.

As it can be seen from Fig. 42, the self-confidence comes with training, practice and experience, and, consequently, the number of "no" answers among second-year students is substantially bigger than among those of the third and the

fourth years of study; whereas the number of "yes" answers to the question about the plans of setting up their own IT business is bigger among the fourth-year students - "bachelor" graduates and that indicates good business potential of IT graduates.

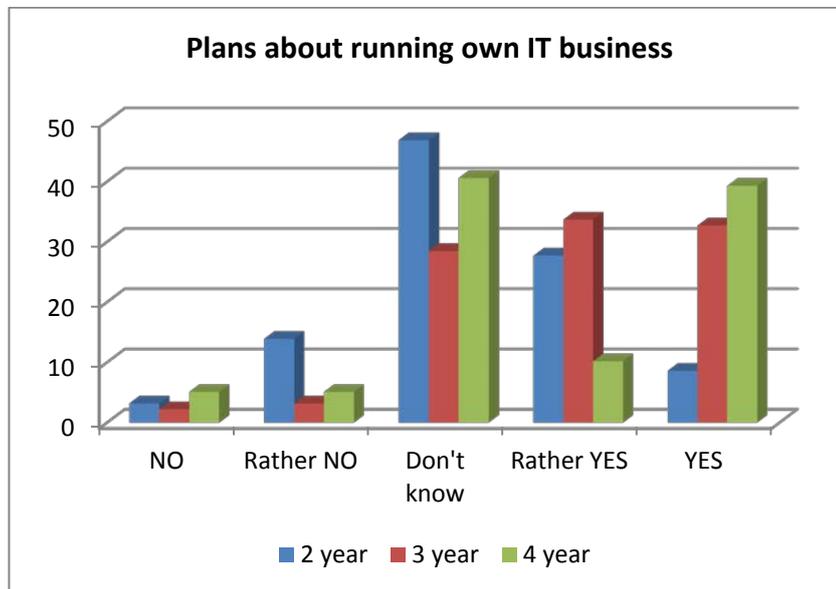


Fig. 42 - The distribution of the relative number of responses to the questions about prospects as for starting their own business among the students of the second-fourth years of study

The similar trends are also demonstrated in Fig. 43 referring to innovation plans, including the development and commercialization of innovative IT products. As the risks of developing own products are smaller compared to running own business, and taking into account the fact that the development of software products is the major production function of IT graduates, the maximum of the dependency of answers for the second-year students shifts from the variant "I don't know" to the variant "rather yes" and "yes". This tendency does not change the overall picture of the distribution of the answers to this question over the years of training of the students and generally shows positive trends in the development of innovative potential of Ukrainian IT students.

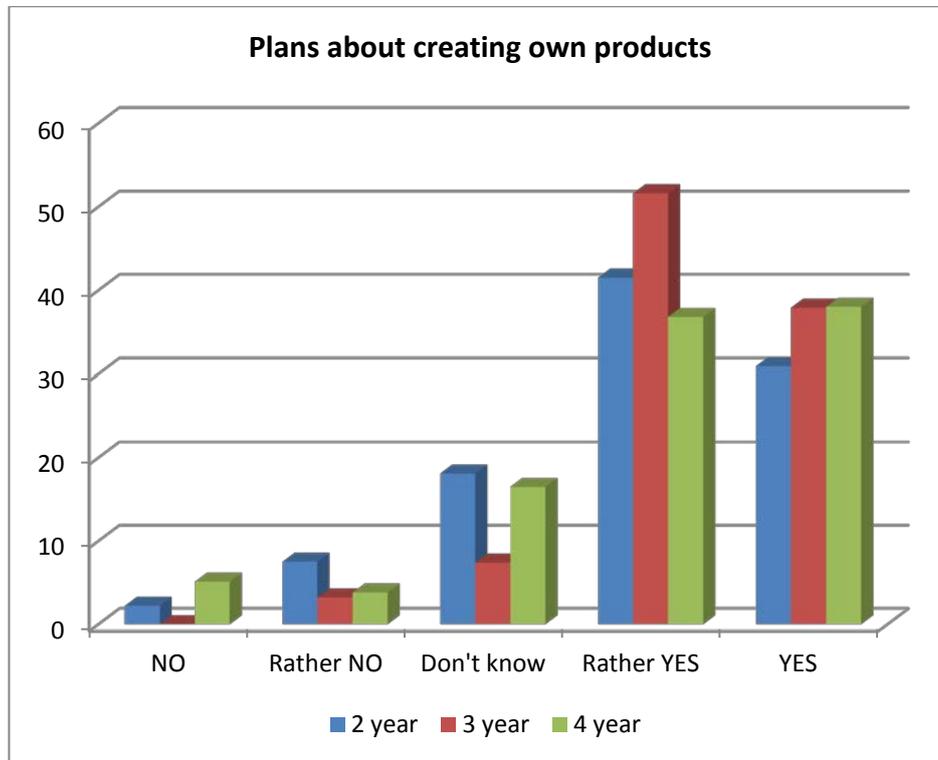


Fig. 43 - Characteristics of innovation potential of IT students of the second-fourth years of study

Hence, from Fig. 41-43 there can be drawn a conclusion about the high entrepreneurial and innovative potential of the Ukrainian IT students.

The next question was "Have you got any real experience of creating your own software product?" and it was aimed to discover available experience of developing own products while studying at university, and it could prove indirectly the adequacy of the answers to the previous question by determining the desire to create their own products with the available experience in this field. The general results of the answers to this question are shown in Fig. 44. As it can be seen from this figure, the distribution of the responses between "yes" and "no" is approximately equal. Thus 48.7% of the respondents have practical experience of creating their own products while studying at university, which greatly strengthens the graduates' innovation potential described above.

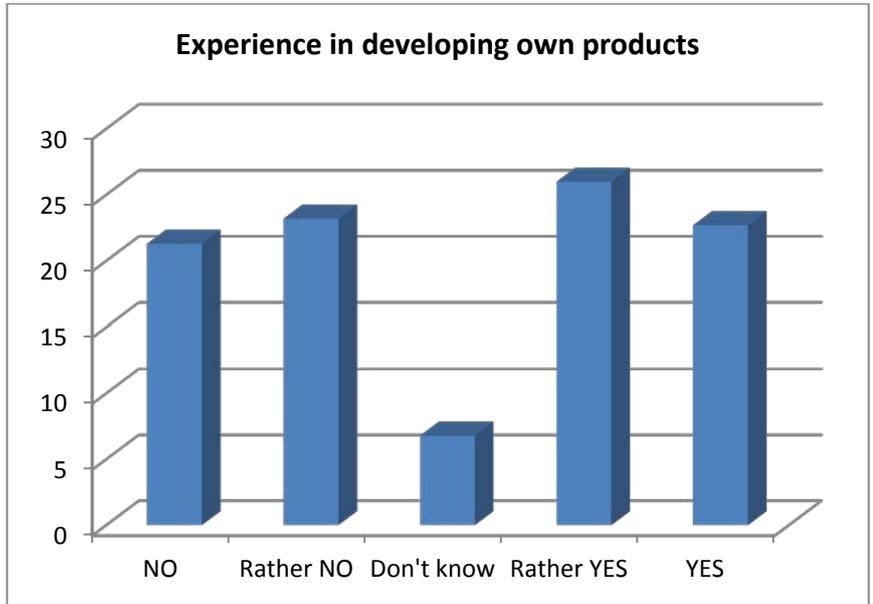


Fig. 44 - Practical experience of IT students in creating their own products

The diagram shown in Fig. 44 illustrates the answers to this question more clearly as it shows if a student has any experience in creating his/her own innovative products, depending on the year of study at university. As it is seen from Fig. 45, mostly senior students have practical experience and answers "no" and "probably not" are given mostly by the second-year students.

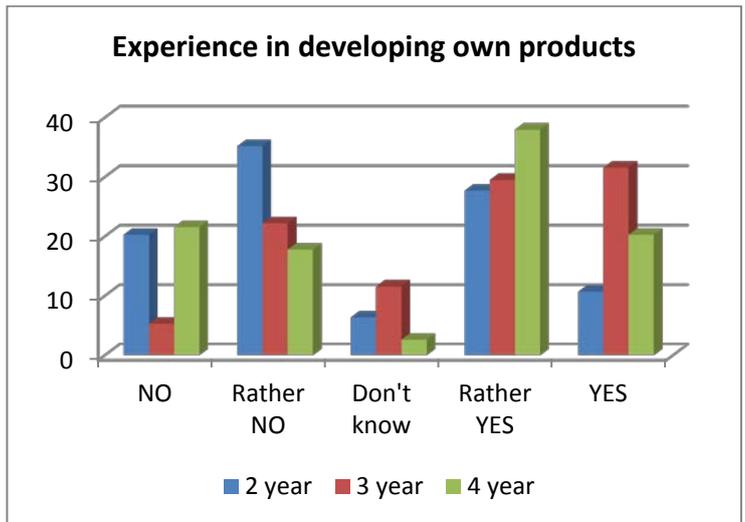


Fig. 45 - The distribution of experience in creating own products depending on the year of study

So, all the facts prove that there is a tendency of increasing practical experience and innovative and entrepreneurial potential of Ukrainian IT students while studying at university.

The next step in evaluating the current state of innovation potential of IT students was the analysis of the responses to the question "Do you have any ideas for new software products or solutions that you can develop and commercialize?" and "Do you have a team of like-minded people to create your own software product or solution?" which was aimed to find out if there are real and workable ideas and a team to do such a job (and therefore the real experience of team work and funds for organizing this activity). 62.3% of respondents gave positive answers to the question concerning the ideas of innovative software products with commercial potential, while only 42.6% of respondents said that they have a team to implement their ideas. Such divergences in responses testify the vital necessity in creating and maintaining virtual innovative space promoting team-building and team work on IT projects in the students' community. The question "How often do you come up with any ideas for improving something or creating a new IT product" was another way of considering how innovations are distributed among students; and the answer to that question demonstrated how students are interested in the current situation in research and developments in the specific professional area. The statistics of the answers to these questions is given in Fig. 46, and it clearly testifies again the lack of a team for developing innovative ideas, which is absolutely necessary in case of creating cutting edge software, as well as the experience of team development and project management are essential to run own business, particularly in the IT sector.

Moreover, Fig. 47 shows a distinct tendency of increasing the number of students ready to produce innovative and commercially attractive ideas in the development of software products depending on the term of their studying at university. Thus, 64.7% of the fourth-year respondents gave positive answers to the question "Do you have any ideas for new software products or solutions that you can develop and commercialize?" against 59.7% respondents of the second-year of study. At the same time, the negative answers were given by 31% of the second-year students and 20.4% - of the fourth year of study.

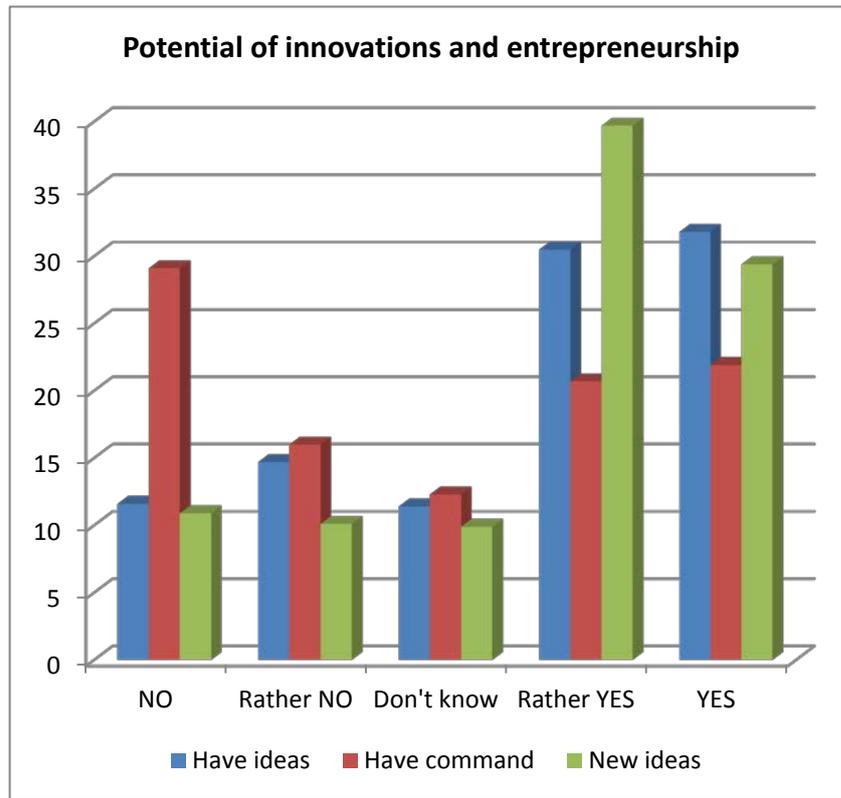


Fig. 46 - Availability of innovative ideas and means of their realization among IT students

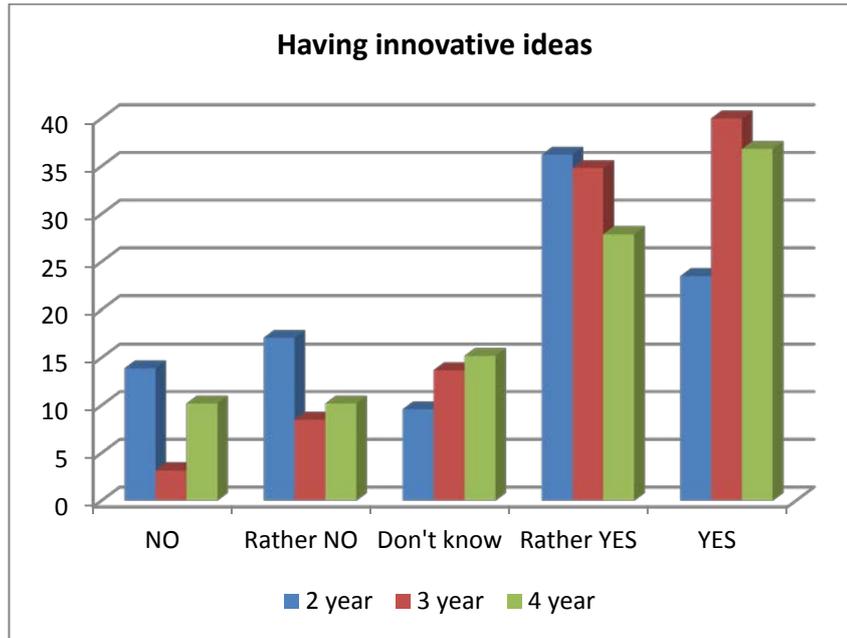


Fig. 47 - The distribution of ideas of new commercially attractive software products among students of different years of study

The above mentioned results show that the quality of IT training in Ukrainian universities is high and graduates have significant potential in the labor market. Thus, the aim of the next set of questions was to detect the main obstacles in the way of implementing innovation potential of next Ukrainian students and creating a lot of successful startups in modern IT industry in Ukraine. The following two questions "Did you gain enough knowledge while studying at university in order to create your own innovative IT software product?" and "Did you gain enough knowledge while studying at university to create your own IT business?" were supposed to give an answer about the sufficiency of the level of theoretical and practical knowledge that students receive while studying at university. Thus the aim was to consider the level of professional and business training of IT students from the students' point of view. The results of the answers to these questions are presented in Fig. 48.

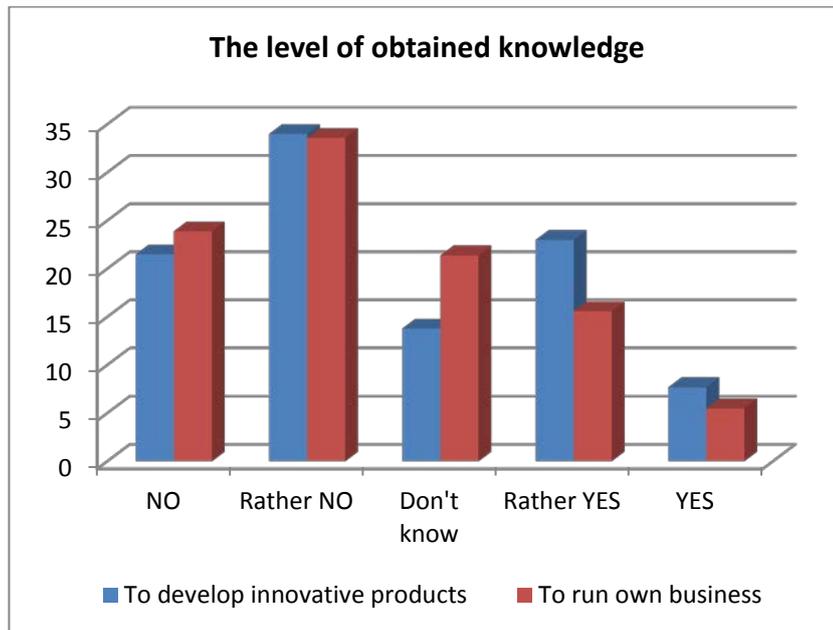


Fig. 48 - Students' assessment of knowledge level about innovation and entrepreneurship received during the training

As it can be seen from Fig. 48 the overall majority of the students are not confident or consider the knowledge received at university to be inadequate for creating their own innovation product (69.3% of respondents) and establishing their own business (78.9% of respondents).

In addition, the students were asked about the practicability of introducing the disciplines related to innovation and entrepreneurship in IT Masters curriculum, and the results of the answers are shown in Fig. 49.

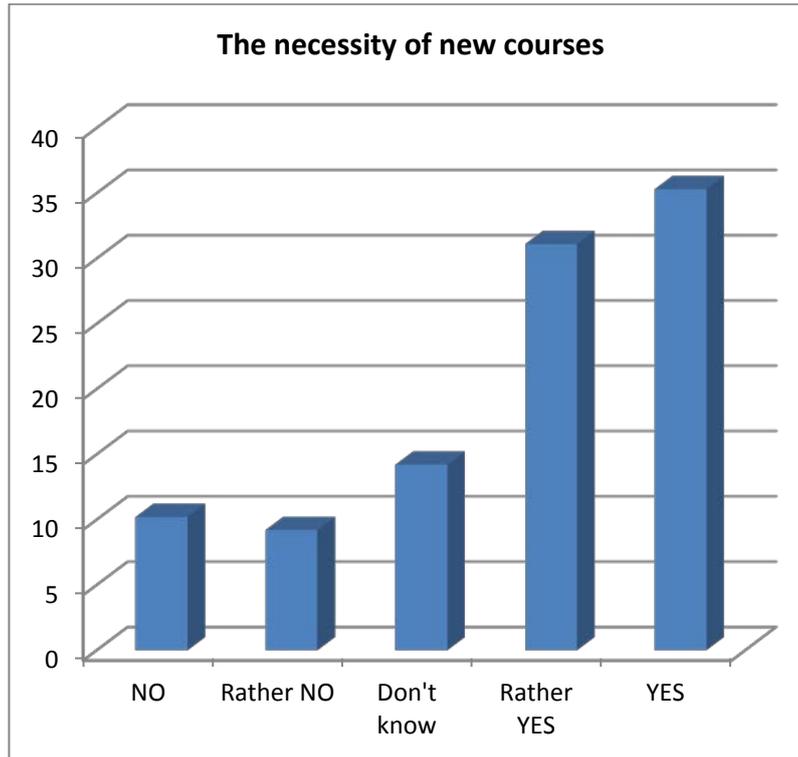


Fig. 49 - The respondents' answers to the question "Do you consider it necessary to introduce new disciplines on innovation and entrepreneurship into the curriculum?"

As it is seen, most of the respondents (66.4%) consider it absolutely necessary to introduce new academic disciplines on innovation and entrepreneurship. If 14.2% of the students who did not give a definite answer are added, then one of the objectives of the project related to the development and implementation of relevant subjects to the national standard of IT experts training will get the overwhelming support.

However, the analysis of the distribution of responses to this question by the years of study (Fig. 50) shows that the second-year students do not actively support the introduction of new disciplines (56.5%) compared to the fourth-year students (74.8%). So the conclusion may be drawn that new disciplines on innovation and entrepreneurship should be implemented into educational and vocational academic program for "master" level.

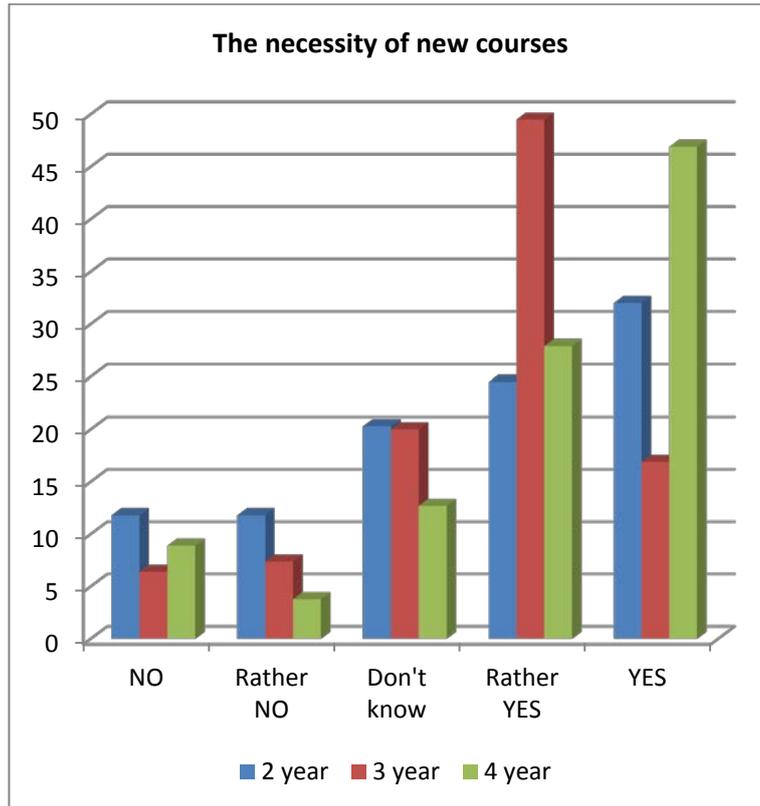


Fig. 50 - Students' level of support for introducing subjects on entrepreneurship and innovation depending on the year of study

In order to identify potential barriers in realizing innovative potential of Ukrainian students the following questions were formulated "Do teachers spend enough time on creative work with students?" and "Are there any conditions available in the university for creating own software products or solutions?". The statistics of the responses is given in Fig. 51. As it is seen the conditions for creating their own software products are considered to be satisfactory (47.4% of "yes" or "rather yes" when 20% of students who have not decided on the response), whereas the level of teachers' involvement in creative work with students still needs to be improved (44.5% of negative responses and 12.3% of students have not made up their mind) e.g. through the introduction of innovation disciplines and collaboration of teachers with students in the information space, including the use of virtual innovative space, the development of which is one of the most important tasks of the project.

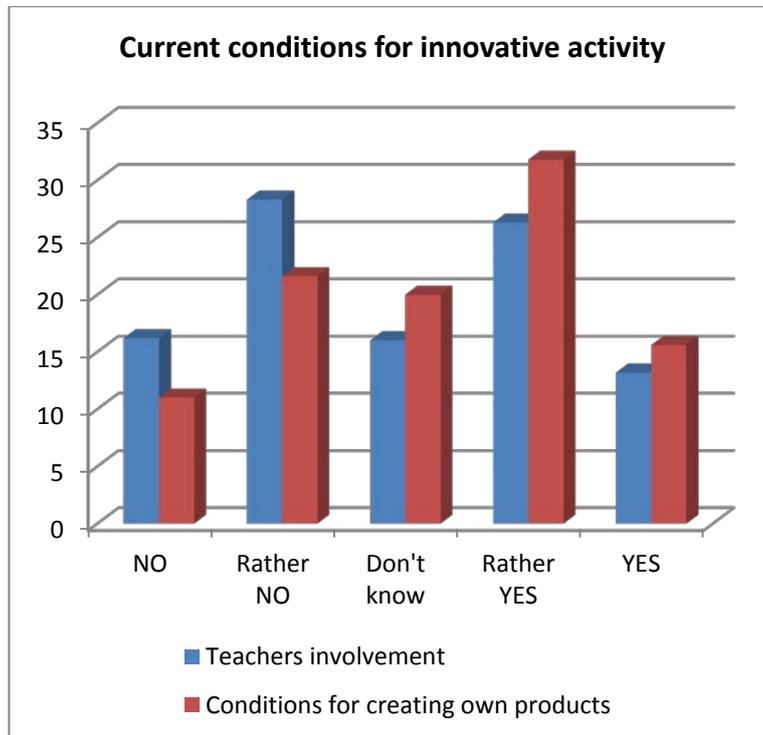


Fig. 51 - Students' assessment of the current conditions for innovation at universities

At the same time, the considerable uniformity of the responses was observed when answering the questions concerning the conditions for creating innovative software products in the university by the students of different years of study (Fig. 52) - the average deviation is less than 1.7, and the variance - 2.6, the median deviation against the sample mean is not more than 0.3. This fact gives evidence of a high level of reliability of respondents' assessment of conditions for innovation in Ukrainian universities.

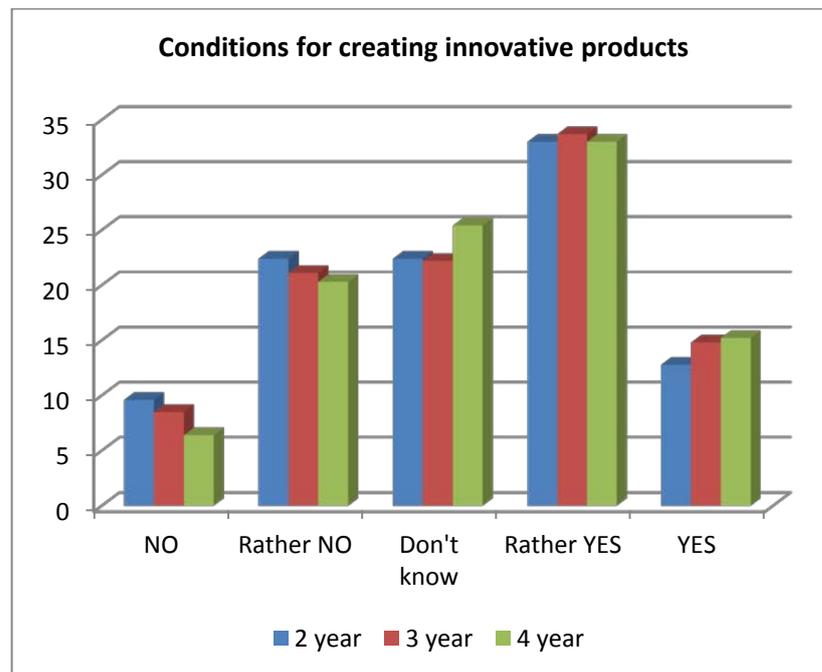


Fig. 52 - Dependence of conditions assessment in the universities for creating innovative software products on the years of respondents' training

The last question was about the students' opinion as for the main obstacles for entrepreneurship and creation of their own innovative businesses in IT industry. The results of the answers to this question are provided in Fig. 53. As it is seen the students (that together makes 74% of respondents) consider the insufficient level of practical training (30.7%), the lack of knowledge in economic and legal issues received during the training (21.8%) and deficiency of a single source of information, mutual aid and search for investors (22%) to be fundamental obstacles in the implementation of innovation and entrepreneurship in the IT field in Ukraine.

Thus, the realization of the Tempus project aims by improving the level of students' practical training, developing and introducing new subjects on entrepreneurship and innovation will find the reflection in the nation-wide standards of IT masters training; the development, implementation and regular support for virtual innovative space as the unified network source of information, collaborative environment, mutual assistance and finding investors will highly improve the reliability of the realization of innovation potential of IT students and increase the quantity of

successful start-ups organized by university graduates, will deepen the ties between industry, universities and students and reduce response time for calls of post-industrial society.

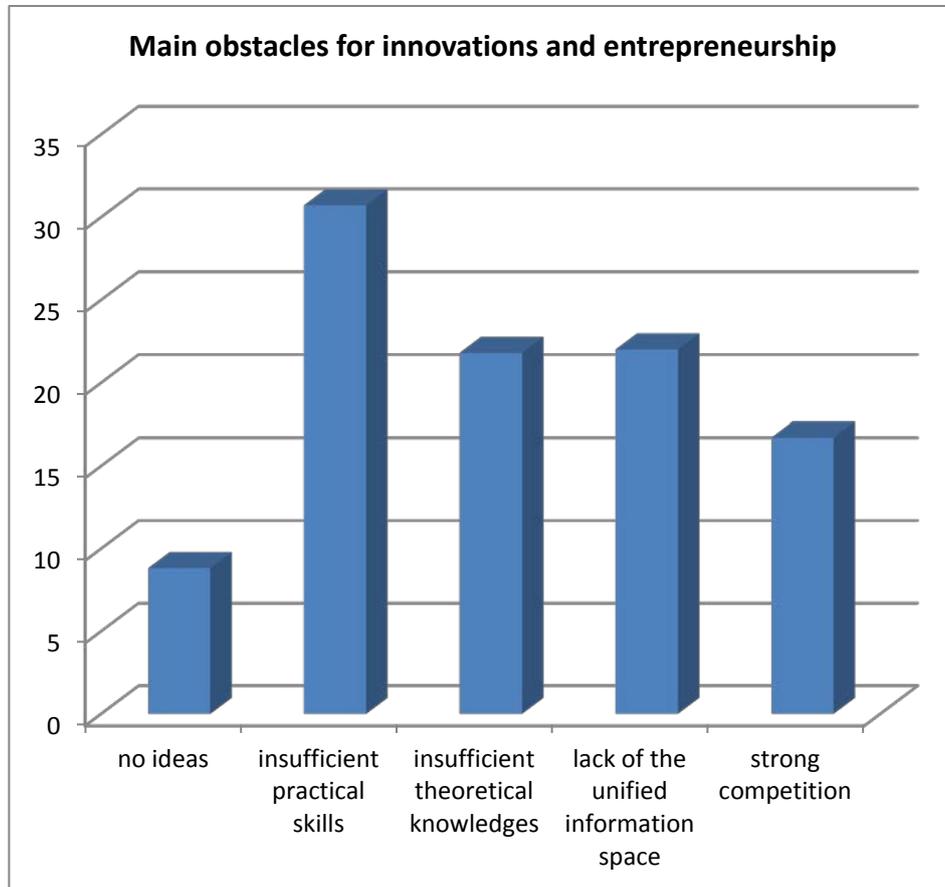


Fig. 53 - Main barriers for innovation and entrepreneurship according to the students' opinion

At the same time, the analysis of the distribution of answers to this question by the years of training (Fig. 54) allows us to trace the following regularities: the absence of ideas and the fear of strong competition in the market are inherent to junior students, it is probably due to the lack of practical experience that correlates with the statement that the insufficient level of practical training is more common for the responses of undergraduate students (37.3% of second-year students against 20.3% of the fourth year students); while at the same time the shortage of theoretical training in the disciplines of economic and legal areas is increasing with the approach of the

end of the term study at university (19, 2% of the second year students against 36.8% of the fourth year students) that can be connected with the practical attempts to start own business or to find an investor for an innovative idea or a product that correlates with the results shown in Fig. 45; the lack of a single information environment is also somewhat more pronounced to the end of "bachelor" training term (22.8% of the interrogated fourth-year students ) which may be for the same reasons.

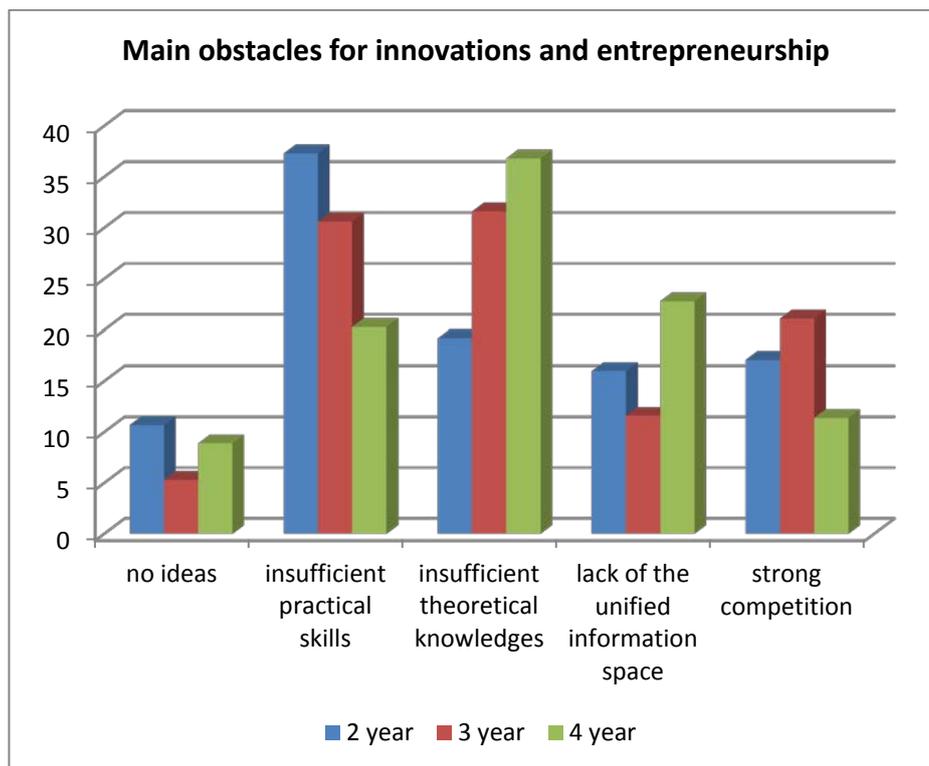


Fig. 15 - Main barriers for innovation and entrepreneurship in the students' opinion

#### CHAPTER 4 Conclusions

The survey of 546 IT students of all years of study of Ukrainian partner universities, the collection and the analysis of the appropriate statistical information have been carried out within the performance of WP2 tasks concerning the research of current situation and tendencies of developing innovations in the context of Ukrainian universities. The analysis of the results of this survey allows with a high

level of reliability to pose the main problems with a current state of IT expert training in Ukraine in the field of entrepreneurship and innovation and to concentrate efforts of the project on the elimination of these problems and further development of innovative potential of Ukrainian IT branch.

The survey results allow to draw the conclusions about the high entrepreneurial and innovative potential of Ukrainian IT students and the tendency of the growing experience of practical activities and innovative and entrepreneurial potential of Ukrainian IT students throughout their training at university. The analysis of the results of students' responses has shown the overwhelming importance of one of the project objectives related to the development and implementation of the relevant disciplines on innovation and entrepreneurship into the national standard of IT expert training, and this fact testifies the appropriateness of these disciplines in the educational and vocational training programs for "master" level.

Thus, the realization of the Tempus project aims by improving the level of students' practical training, developing and introducing new subjects on entrepreneurship and innovation will find the reflection in the nation-wide standards of IT master training; the development, implementation and regular support of virtual innovative space as a single network source of information, collaborative environment, mutual assistance and finding investors will highly improve the reliability of the realization of innovation potential of IT students and increase the quantity of successful start-ups, organized by university graduates, will deepen the ties between industry, universities and students and reduce response time for calls of post-industrial society.

All these facts demonstrate the critical importance of the results of this project for the development of innovative and entrepreneurial potential of Ukrainian IT students, the development of education in Ukraine and its integration into the European educational space, and the enhance of competitiveness, innovation and knowledge-intensity of Ukrainian economy and IT industry in particular.



### GENERAL RECOMMENDATIONS:

1. Each university should clearly identify the person which will be responsible for cooperation with companies in a field of innovations and entrepreneurship among IT - students.

2. Each university should establish an appropriate unit, the main features of which will be work with companies in a field of innovations and entrepreneurship among IT - students. By name and essentially the most suitable are: Center for Innovation, Commercialization and Entrepreneurship, Business Incubator Center. At the state level should be developed Standard Regulations on innovation, commercialization and entrepreneurship for Universities.

3. The best experience of leading universities should be shared among all Ukrainian Universities.

4. At the governmental level for all IT – programs should be developed an typical syllabus for courses such as: "Economics and Business", "Intellectual Property", "Technical and scientific creativity", "Basic scientific research", "Basics of Business", "Management innovative projects. "

5. Should be taken into account the innovative potential of students for Master and PhD programs.

6. Advice mechanism for the protection of intellectual property, which would have provided the payments of royalties to the students should be developed.

## BIBLIOGRAPHY

1. Law of Ukraine "On the innovation"
2. Buligescu, B., Hollanders, H. and Saebi, T. (2012), "Social attitudes to innovation and entrepreneurship". PRO INNO Europe: INNO Grips II report, Brussels: European Commission, DG Enterprise and Industry.
3. Smit and Bram van der Linden (2012), "Effects and impact of entrepreneurship programmes in higher education" . Report. Brussels: European Commission
4. Niels Bosma, Sander Wennekers and José Ernesto Amorós (2011), "Extended Report: Entrepreneurs and Entrepreneurial Employees Across the Globe". Report
5. Petra Gibcus, Dr. Jan de Kok, Jacqueline Snijders, Lia (2010). A survey in the EU, EFTA countries, Croatia, Turkey, the US, Japan, South Korea and China

## APPENDIX A

Official request from Ministry of Education and Science, Youth and Sport of  
Ukraine (English version and original language)

MINISTRY OF EDUCATION AND SCIENCE, YOUTH AND SPORT OF  
UKRAINE

According to the action plan of the development of education in the field of information technology till 2013, approved by the Cabinet of Ministers of Ukraine dated September 21, 2011 № 1036 and to examine the issue of increasing importance of innovation and entrepreneurial component in educations in IT - field please submit to the Department of Scientific and licensing the following information:

1. General information about training for IT - industry (estimated form attached).
2. Curricula in all areas of training related to training in IT - field ("bachelor", "Specialist", "Master").
3. Work program and syllabus of training courses of innovation and entrepreneurship.
4. Regulations on the unit that organizes innovation and entrepreneurship activities for students and teachers, if such a unit is.
5. Curriculum and work programs of specialty 8.18010012 "Innovation management".

Information should be sent electronically to the [m\\_danchevska@mon.gov.ua](mailto:m_danchevska@mon.gov.ua),  
[tmv1992@bigmir.net](mailto:tmv1992@bigmir.net).

Director of department

Oleksandr Iakymenko



МІНІСТЕРСТВО ОСВІТИ І НАУКИ,  
МОЛОДІ ТА СПОРТУ УКРАЇНИ  
ДЕПАРТАМЕНТ НАУКОВОЇ ДІЯЛЬНОСТІ ТА ЛІЦЕНЗУВАННЯ

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На № \_\_\_\_\_ від \_\_\_\_\_

Керівникам вищих навчальних закладів III-IV  
рівнів акредитації

Про подання інформації

Відповідно до Плану заходів щодо забезпечення розвитку освіти у сфері інформаційних технологій на період до 2013 року, затвердженого розпорядженням Кабінету Міністрів України від 21 вересня 2011 року № 1036 та з метою вивчення питання щодо підвищення значущості інноваційної та підприємницької складової при підготовці фахівців для ІТ - галузі просимо до **22 листопада 2012 року подати до департаменту наукової діяльності та ліцензування наступну інформацію:**

1. Загальну інформацію про підготовку фахівців для ІТ - галузі (орієнтовна форма додається).
2. Навчальні плани за усіма напрямкам підготовки, які відносяться до підготовки фахівців для ІТ – галузі (за рівнями «Бакалавр», «Спеціаліст», «Магістр»).
3. Робочі програми тих навчальних дисциплін, за якими студенти отримують знання та вміння з інноваційної та підприємницької діяльності.
4. Положення про підрозділ, який організує інноваційну та підприємницьку діяльність студентів та викладачів, якщо такий підрозділ є.
5. Навчальний план та робочі програми за спеціальністю 8.18010012 «управління інноваційною діяльністю».

Інформацію просимо надсилати в електронному вигляді на адресу [m\\_danchevska@mon.gov.ua](mailto:m_danchevska@mon.gov.ua), [tmv1992@bigmir.net](mailto:tmv1992@bigmir.net).

Директор департаменту

О. В. Якименко

## APPENDIX B

Questionnaire from Ministry of Education and Science, Youth and Sport of  
Ukraine

1. Is there a leader to whose duties include the development of innovation and entrepreneurship among IT - students?
2. Does Universities have a special unit that organizes innovation and entrepreneurship activities among students?
3. What kind of student's activities in the field of innovation and entrepreneurship are in your high school?
4. Thought your experts about what is knowledge and skills of entrepreneurship and innovation should receive students during study?
5. Which companies and organizations are working with your university?
6. How Universities deals with intellectual property of student's innovative products?
7. What innovative products were created in your universities by IT – students?
8. Does university have startups created by students?

## APPENDIX C

## Students Questionnaire

1. Student of which course you are?
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
2. Do you think that the IT industry is the area in which you will work?
  - No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
3. Are you planning to open a business that is related to IT In the future?
  - No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
4. Are you intending to create your own software or solution for the implementation of its investors?
  - No
  - Rather no than yes

- I don't know
  - Rather yes than no
  - Yes
5. Do you have real experience of creating your own software now?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
6. Do you have enough knowledge to create own innovative software product?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
7. Do you have enough knowledge to create own business, which is associated with IT?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
8. Is there enough time given to teachers for creative work with students?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no

- Yes
9. Do you have ideas for new software products or solutions which can be developed and commercialized?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
10. Do you have a team of like-minded people to create own software or solution?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
11. What do you think about the University? Is here all conditions to create own software products or solutions?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no
  - Yes
12. Do you think it's necessary to introduce new disciplines of innovation and entrepreneurship students to the learning process?
- No
  - Rather no than yes
  - I don't know
  - Rather yes than no

- Yes

13. Do you often have an idea regarding the improvement of something or a new product related to the IT industry?

- No
- Rather no than yes
- I don't know
- Rather yes than no
- Yes

14. What do you think is the main obstacle to business operation and starting own innovation business in the IT industry?

- lack of motivation (ideas)
- lack of practical training
- insufficient level of knowledge economic and legal character received during studying the specialty
- absence single source of information, mutual assistance, finding investors
- strong competition in the market

15. Which software or solution which was created by Ukrainian developers do you know?

