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CROATIAN NATIONAL INNOVATION SYSTEM: HOW TO CREATE AND TRANSFER KNOWLEDGE AND TECHNOLOGY

INTRODUCTION

Increasing export activity is the basic precondition for Croatian economic development. The Croatian market is small and insufficient for more powerful growth, and, because of conditions of globalization, it faces competition both in the domestic market and in exporting outside the Croatian borders. Croatian enterprises have to be aware of these facts and bear in mind that the export of knowledge and technology presents the only way towards competitiveness in the global market. The enterprise can be observed as a system that integrates the specialized knowledge of individuals, transforms it into goods and services, and thereby creates knowledge and technology (Grant, 1996).

Enterprise efficiency in creating knowledge and technology is at the highest level in countries that have successful national innovation systems. Constituent factors in a national innovation system are: "producers" of knowledge and innovations, infrastructure backup and entrepreneurs – the actual users of innovation. The national innovation system unites all the different factors that contribute to innovation development and the realization of innovation processes and includes an institutional infrastructure network of developing innovation centres, technological parks, backup financial institutions (venture capital, business angels), etc. The main components of a national innovation system are innovative enterprises, the education system, the financial system and the government (Nelson, 1993).

The aim of this paper is to analyze the characteristics of the Croatian system for innovation stimulation and to suggest measures for its improvement on the basis of research results on innovative activity in Croatian enterprises and based on the experience of successful countries.

The paper consists of the following parts. First, the characteristics of the Croatian system for innovation stimulation will be described. Second, the results of research on innovation activity in Croatian enterprises will be

shown. This is followed by a description of successful Croatian enterprises and those of other countries which are successful in giving incentives to innovation. Finally, measures for the improvement of the Croatian innovation system will be presented.

GIVING INCENTIVES TO INNOVATION IN CROATIA

The Ministry of Science and Technology presented in 1999 the National Science and Research Programme which defines: (1) the role of science and technology in the development of the Republic of Croatia; (2) the direction of national investments to science and technology; (3) the drawing up of a strategy plan of viable development and the application of new technologies; (4) incentives for scientific and technological development and (5) international cooperation in science and technology.

The bearers of technological and scientific development according to the Programme are: the economy sector, the sector of university education, public scientific research institutions, and private non-profit institutions. The programme envisages the construction of a national network of technological centres through the following institutions: (1) business- innovation centres, (2) centres for technology transfer, (3) financial institutions, (4) institutions for prognosis and supervision, (5) innovational and engineering services, and (6) other centres of technological excellence. The most important activities conducted in the Croatian economy with a view to giving incentives to innovative activities are described below.

HITRA Programme

The Croatian Programme of Innovative Technological Development (CPITD-HITRA) encompasses the public scientific-research sector and the economy, and in this way integrates scientific and technological policies. The HITRA Programme consists of two sub-programmes which are complementary in their goals and purpose: Technology projects – TEST and Knowledge-based companies – RAZUM (PRUDENCE). The first falls under the responsibility of the Ministry, while the latter is performed by the Business–innovation Centre of Croatia – BICRO.

The technological research-development project (TEST) finances the development of the "idea" in the "original solution", and stimulates the activation of scientific-research resources based on the idea of the entrepreneur, as well as the development of academic entrepreneurship. The draw-

ing up of feasibility studies and evaluation reports on the enterprise are the subject of the RAZUM (PRUDENCE) sub-programme.

Entrepreneur Centres

More than 20 entrepreneur centres are under development in Croatia. In addition, four technology centres in Zagreb, Rijeka, Osijek and Split are supported by the Ministry for the development of technology-based businesses. There is also the Technology Park supported by the City of Zagreb, the oldest centre, which serves as an incubator for numerous small enterprises in the initial phase of development, and which are given space, expertise and financial help for growth and expansion.

Stimulation of innovative entrepreneurship and protection of intellectual property rights in Croatia

Government and non-government institutions may provide incentives to innovative entrepreneurship. The most frequently mentioned associations are: the Croatian Federation of Innovators, different associations of innovators, and the Association for Inventive Work at the Croatian Chamber of Economy. The Croatian Federation of Innovators in the Community for technical culture under the patronage of the Department of Education and Sport reports each year on about 300 inventions for patent protection, which contributes considerably to the development of the Croatian economy. The Association for Inventive Work is a non-profit organization and gathers members from all layers of society and the economy – associations of innovators, individual innovators, enterprises that conduct inventive work, technology parks and centres, development-research institutes, and faculties and institutions which conduct research and development of new products and technologies.

Numerous laws exist which constitute a legal frame for the Croatian system of intellectual property. However, this is not enough for the protection of intellectual property. Croatian innovators often object to the long and costly patent process. There are many innovations in Croatian enterprises, but there are not so many whose intellectual rights have been protected (Andrijević-Matovac, 2003).

The Ministry of the Economy, Labour and Entrepreneurship

The Ministry of the Economy, Labour and Entrepreneurship ensures the initial budget, non-returnable subsidies in the form of incentives for the introduction of innovation

in the market which are intended for technological monitoring of the idea, as well as credit resources for entrepreneurs who use innovations in their production and business.

The Croatian Agency for Small Business (HAMAG) has been established. It is envisaged as an institution which will coordinate the implementation of medium-term and short-term programmes of development of small enterprises. It is a special professional government body for small businesses, and aims at realizing a unique approach in the improvement of efficiency in carrying out incentive measures. In the frame of its activity there will be incentive measures for innovative activities in small and medium enterprises.

RESEARCH ON INNOVATIVE ACTIVITY IN CROATIAN INDUSTRIAL ENTERPRISES

Methodology and research sample

Research was conducted on the level of innovative potential in successful enterprises in Croatian industry (Andrijević-Matovac, 2003). Industrial enterprises were selected since they are the main actors and incubators of innovative activity.

The research methodology was developed on the basis of the OSLO Manual (OECD, 1992), which was used for the development of a questionnaire used for gathering information on innovation and the intellectual capital of successful enterprises in Croatian industry. On the assumption that large enterprises have a research and development department and thus a higher level of innovative activity (Archibugi, Michie, 1997), the sample included 300 large industrial enterprises selected by the criterion of total income. The questionnaire was sent to the enterprises for the first time in October, 2001. A total of 58 enterprises responded to it in the first round. The questionnaire was sent for the second time to the rest of the enterprises in March, 2002. In the second round another 33 enterprises responded. In total, the questionnaire was responded to by 91 enterprises, making up 33% of the whole sample, which is considered acceptable for this type of research (Alreck, 2001). The main results of the research are presented below.

Main results of the research

The main results of the research on innovation activity in Croatian enterprises are presented and are compared with the experiences of enterprises in the European Union and in countries in transition: (1) ways of acquiring new technologies; (2) innovation activities; (3) aims of innovation activities; (4) resources of ideas and information for innovation activity; (5) factors that give incentives to and disrupt innovation activities; (6) concession of material rights to technology; (7) development strategies connected with innovation activities; and (8) investment in knowledge, research and development.

Ways of acquiring new technologies

A large number of Croatian enterprises purchased capital equipment, while other means of acquiring new technologies were as follows: buying information systems with new technologies, production processes with new technologies, services with technology contents, materials or semi-products with new technologies, and engaging experts. The acquisition of new technology increased in the period 1996-2000 in comparison with the period 1990-1995 (Table 1). A large number of enterprises acquire new technologies from European countries, while the number of enterprises which acquire new technologies from Croatia and the USA is very small. The rest of the countries are much less significant as a source of new technologies for Croatian enterprises.

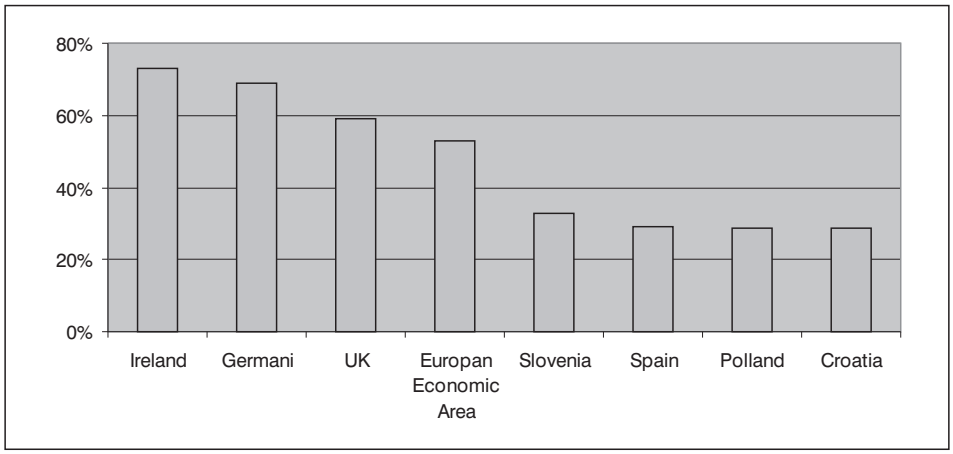
Table 1
Number of enterprises per acquisition of new technologies for the periods 1990-1995 and 1996-2000

The way of acquisition of new technologies	1990-1995	1996-2000
Research-development contract (cooperation)	4	7
Patent purchase	4	6
Purchase of industrial models and samples	7	2
Purchase of trade marks	6	1
Purchase of business secrets	6	7
Purchase of rights for use of foreign inventions	5	2
Purchase of information systems with new technologies	17	31
Purchase of capital equipment	32	50
Services with technological contents	17	18
Production processes with new technologies	16	41
Materials and semi-productions with new technologies	12	28
Engaging experts	16	31
Other activities	4	9

Innovation activities

Croatian enterprises have a low level of innovation activity in comparison with the countries of the European Union, both in relation to the "old" member states and the "new" member states. All the research work was done according to the instructions of the Oslo Manual (Mickiewitz et al., 2001), but it was conducted in different periods of time. However, since the same methodology was applied, the results are considered suitable for comparison. The research on 6 EU countries was conducted in the period from 1995 to 1997, the research on Slovenia in 1998, and on Poland from 1997 to 1998. For example, the share of Croatian innovation enterprises for the period from 1996 to 2000 was 28.6%, while the share of innovation enterprises in Slovenia was 33% in 1998.

Figure 1
The share of enterprises that had innovation activity from selected countries (Andrijević-Matovac, 2003 and Mickiewicz et al., 2001).



The innovation activity of Croatian enterprises can also be evaluated on the basis of the structure of innovation costs. Croatian enterprises spend a great amount of resources on the acquisition of patents and licences, and less on research-development activity than enterprises in the European Union (Radošević, 2002). On that basis we can conclude that in comparison with EU countries only in very few cases do Croatian enterprises produce new technology on their own.

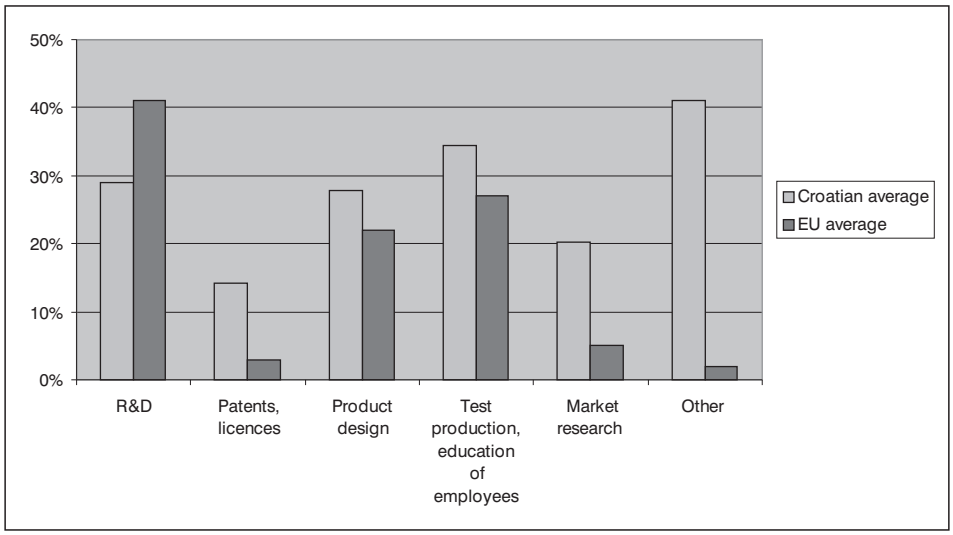


Figure 2
Innovative activities with innovation costs in percentages (Andrijević-Matovac, 2003 and Radošević, 2002)

Aims of innovation activities

Croatian industrial enterprises cite the following aims of their innovation activities as the most important: introduction of new products, widening of their product line within their basic programme, widening of the market, reducing costs, but increasing quality. This does not distinguish Croatian enterprises from enterprises in the EU and Russia (Radošević, 2002), which quote similar aims as the most important ones.

Sources of ideas and information for innovation activity

The most important sources of ideas and information for the innovation activity of Croatian enterprises are a company's management, research and development, and sales and marketing. Buyers and clients are in fourth place. On the other hand, enterprises in the European Union put buyers or clients in first place, followed by internal sources – management, and research and development (Radošević, 2002). We can conclude that Croatian enterprises are still not aware of how important a buyer's satisfaction is.

Factors that give incentive to or disrupt innovation activities

For Croatian enterprises the most important factors which give incentive to innovation activity are the management's vision of the enterprise on one hand, and the human and research potentials of the enterprise on the other hand.

These factors are internal factors. Among the external factors, information about the market is ranked the highest, while certain relief for innovation activity has been ranked relatively low.

The next obstacles in innovation activity quoted as the most important by Croatian enterprises are: insufficient financing, an excessively long period of return on investment, and small innovation potential. This is similar for enterprises in the "old" member states of the European Union, and for the new members, Slovenia and Hungary (Radošević, 2002).

Concession of material rights to technology

The results of Croatian research show that fewer than 10% of enterprises from the sample would concede technology to other enterprises, and the most common way of doing this was the sale of capital equipment into European countries. A similar situation can be found in the countries of the European Union (Radošević, 2002).

Development strategies connected with innovation activities

The respondents evaluated the importance of the goals connected with innovation activities as part of the strategy of their enterprise. One of the aims connected with innovation activities received relatively high grades, but these were the aims connected with the existing comparative advantages of the enterprise: the introduction of new products in existing markets, improving existing technologies, more efficient use of existing materials and continuous education of personnel.

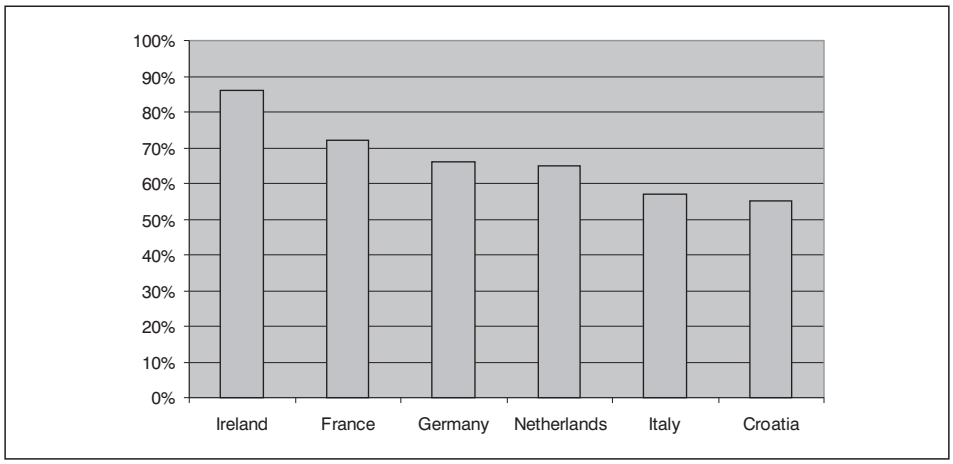
However, the aims that would enable the development of knowledge and technology received lower grades, and they related to the development of new technologies, the creation of an innovative organizational structure, the introduction of a reward system for innovation research scientists, the use of new materials and the improvement of technologies developed in other enterprises.

Investment in knowledge, research and development

Most Croatian enterprises invest in the education of personnel. However, it is necessary to point out that the largest share of resources was spent on courses in foreign languages and the education of production workers and administrative staff.

More than half of Croatian enterprises conduct research-development activities (Figure 3), which lies within the range of most European countries (Mickiewiz et al., 2001). The situation looks good at first sight, but it is necessary to take into consideration that Croatian enterprises spend on average 2.8% of total income on research and development. Since larger investments in research and development would stimulate the growth of the enterprise, as well as economic growth as a whole, investments from 5 to 10% of total income are recommended (Brown et al., 1998). Although a great number of Croatian enterprises conduct research-development activity, it is common that they invest very small amounts in it.

Figure 3
Share of enterprises that invest in research and development (according to Andrijević-Matovac, 2003 and Mickiewicz et al., 2001)



Summary of the research

On the basis of the research conducted on the enterprises of Croatian industry, the following conclusions can be made about innovation activity in Croatian enterprises. New technology was acquired by half of the enterprises in the sample in the period from 1990 to 2000, but in the same period approximately 1/10 of the enterprises conceded their technology to other parties. In most cases this involved the purchase or sale of capital equipment. On the basis of this information it can be concluded that innovation activity in Croatian enterprises is low. This conclusion is confirmed by the fact that 28.6% of Croatian enterprises in the period from 1996 to 2000 reported innovation, which is considerably lower than the average of the European Union, and lower than is common in other transition countries. Croatian industrial enterprises make the largest part of their income on other products that are essentially unchanged or subject to gradual change.

Investment in innovation activity is mostly earmarked for the acquisition of patents and licenses, and their exploitation (test production, education of employees and technical preparation). On the other hand, enterprises from the European Union invest most of their resources in research and development. The smallest share of the total income of Croatian enterprises is made from newly introduced or considerably changed products. Investing in research and development is also low. It seems that the primary goal of Croatian enterprises is to use innovation to maintain their good position in the market, but they do not consider themselves to be innovative organizations which should create new knowledge and technology.

However, the situation is not as bad as it seems at first sight. The number of enterprises which reported innovations increased in the period 1996-2000, and the same applies to the average number of innovations by enterprise. At the beginning of the observed period, only 10 enterprises reported innovations, with 7.8 innovations per enterprise on average, and their number increased at the end of the period to 21 enterprises with reported innovations, with an average of 11 innovations per enterprise. However, in the same period, patent activity was much weaker than innovative activity due to the war events in Croatia and to a long patent process.

Croatian enterprises quote approximately the same goals for innovation activities as enterprises in the European Union and in Russia: the introduction of new products, enlarging the product line within the basic programme, expanding the market, reducing costs, but also increasing quality. It is the same with the factors that stimulate innovation activity and with the obstacles for innovation activity. It is promising that the strategic goals connected with innovation activity received high scores. However, these goals are connected to improving existing programmes: introduction of new products in existing markets, improvement of existing technology, more efficient use of existing materials and continuous education of personnel. On the other hand, the following goals were also reported: the development of new technologies, the creation of an innovative organizational structure, the introduction of a reward system for innovation research scientists and the use of new materials. These are the very factors that could enable the real development of new knowledge and technologies.

EXPERIENCES OF SUCCESSFUL CROATIAN COMPANIES

In the research of innovation activity in Croatian enterprises (Andrijević-Matovac, 2003), special emphasis was put on the experiences of Croatian enterprises which are successful in the field of innovation. The following areas will be analyzed and compared with the average of Croatian industry: goals of innovation activities, sources of ideas and information for innovation development, obstacles and stimulating factors for innovation activities, and enterprise development strategies.

Successful enterprises conduct innovation activities aimed at expanding their assortment, winning new markets and improving conditions of work and business, for which emphasis was laid upon the introduction of new products within the basic programme and winning new market segments. The average Croatian enterprise, on the other hand, emphasizes decreasing the costs of labour, materials, energy and even cutting costs of designing products. In other words, successful enterprises see innovation as a breakthrough into new markets with the help of new products, whereas the average Croatian enterprise hopes that innovations can help reduce their costs.

The source of ideas and information for innovations can come from outside or inside the company. The average industrial enterprise in Croatia relies to a great extent on outside sources of ideas and information, such as buyers, clients, competition, suppliers and fairs/exhibitions. On the other hand, successful enterprises in most cases use their own research and development department, but they also gave high grades to institutional external sources of ideas and information.

The national innovation system aims to remove obstacles and increase stimulation for innovative activity. Consequently, we conducted a special analysis of what stimulation factors and obstacles were highlighted by the average Croatian industry. Successful companies think that insufficient sources of financing and a too long period of return on investment are the biggest obstacles to innovation activity. The research-development capacity and the research potential of enterprises are predominant stimulating factors for innovation activity. The average Croatian industry also mentions factors that prevent the introduction of change in the enterprise and an insufficient capacity to use technical services, while the stimulating factor for innovation activity is expected from a "higher level", that is, from the management or from the government.

For innovation activity in a company, it is important that innovations are part of the enterprise strategy. In such a way, the strategy of successful enterprises is connected with innovation and knowledge, and high grades were given to the introduction of new products in existing markets, the launching of existing products in new markets, new technological development, improvements in the motivation system for better management and continuous education of the staff. However, the average Croatian industry gave those strategic aims considerably lower grades.

The characteristics of successful Croatian companies confirm the results of Australian research that investigated which forces led some companies to engage in more innovation activities (Webster, 2003). The results of that survey show that factors common to all industries, such as extent of learning, knowledge spillover, appropriability and managerial style, are the most important.

EXPERIENCES OF THE COUNTRIES SUCCESSFUL IN THE STIMULATION OF INNOVATIONS

For the purpose of defining more clearly the measures that could increase the efficiency of the Croatian system for stimulating innovation, the experiences of the leading countries in the field of knowledge and technology export are analyzed below. Ireland and Finland have been selected for this analysis.

Irish national innovation system

The rapid growth of the Irish economy over the past few years is connected with the sector of high technology (Irish Council for Science, Technology and Innovation, 2001). In the period from 1990 to 1996 production increased by 75.5%. The growth was mainly contributed to by pharmaceutical (157.8%) and information companies (92.4%).

Such fast progress is the result of the view of the Irish government that an advanced economy that wishes to use its innovation potential to the full has to develop and maintain connections between numerous components of a national system of innovation: (1) universities and similar institutions that conduct basic research and which "form" highly-educated experts; (2) enterprises, especially those which invest in knowledge-based business; (3) public and private institutions which support education in general as well as training for certain professions; (4) government agencies that finance and conduct activities for the promotion and advance of technological change.

In the National Development Plan for the period 2000-2006, the Irish government has allocated 2.4 billion EUR for research, development and innovation activities (Ireland R&D Information Service, 2002), which will be distributed through all government departments and agencies. The following activities will be financed: education and training (elementary, secondary and lifelong education), higher education (interaction with industry, technology awareness, research programmes and design), financing (enterprises and councils), promotion of innovation (rewards, companies, media), innovation structure (information technology, commercialization of technology, technological incubators and innovation knots).

Finnish national innovation system

The main characteristic of the Finnish policy in science and technology has been long-term continuous development since 1980 (Seppala, 2001). Finland has conducted a successful transition from a manufacturing to a knowledge-based economy. On the other hand, in order to maintain a successful position, it is necessary to continuously invest in the production of knowledge, which includes the following factors: (1) good conditions for the development of the IT industry through a policy of education, science and technology; (2) the development of other areas apart from information science, for example, biotechnology and knowledge services, (3) increasing the level of the application of research results with greater cooperation between the public and private sector, and (4) developing universities as the foundation for the intellectual and material good.

RECOMMENDATIONS FOR THE DEVELOPMENT OF A SUCCESSFUL NATIONAL SYSTEM

A national innovation system can also be defined as a body of institutions whose interactions define the creation of innovation, in the sense of "national companies" (Nelson, 1993). The task of a national innovation system is to trigger and allocate resources and to manage the risk inherent in technological advance. Recommendations for a successful innovation system are the following (West, 2001):

- All elements of the system have to be present and structured so as to complement one another. Otherwise, they will be of little use.
- Non-profit institutions have to sponsor factors of knowledge creation. Individual participants in a com-

pletely competitive market cannot have a sufficient return to justify the risk; in other words, a free market left to its own mechanisms will allocate fewer resources for innovations than is needed.

- The economy has to set considerable investment resources in motion and submit them to unequally risky ventures in relation to other potential investments. Savings and investments should be directed to risky, but potentially lucrative, sectors until the enterprises that are the bearers of innovation and new technologies "get back on their feet".
- When you "enter" a new industry, it is necessary to find a way of diversifying risk. In the long run, this is often done by using investment capital (USA), government and banks (Europe) or large corporations (Japan).
- The structure of risk and the reward system will influence the selection of an optimal system of risk management. Risks encountered by innovative enterprises "are technical, market and managerial". A national innovation system has to give support to the management of technical risk, while the owners of enterprises are experts in the management of market and managerial risks.
- Innovations generally improve the whole economic productivity, either by improving or closing down certain industries.
- In non-productive intensive industries, the most valuable things are "trapped" by the owner of the company.

The Croatian innovation system has only recently started to develop and it is hard to expect it to be sufficiently prepared for the new challenges of the global information society:

- The Croatian activation of resources is weak and the allocation of capital and risk management show that there is a prejudice against technological innovations. Although we are all proud of our innovators who achieve success in international competitions, an investor willing to finance their ideas can seldom be found. In other words, there is a need for a better connection between the manufacturing sector and the generators of innovations, such as talented individuals and universities.
- In Croatia there is no institutional support for investment in risk ventures which are potential generators of development. At present, programmes like HITRA and TEST are just small ones, and considerable resources need to be invested in them.

- There are no resources for diversifying the risk of "entering" a new industry. In the Croatian economy, which is based on the concept of the free market, there are no such instruments.
- The closing down of existing industries is even more important for small nations like Croatia. For example, it is expected that biotechnology will develop new substitutes for raw materials and semi-products in the production of energy, agriculture and in the food industry, as well as in the defence industry. This means that countries that will not participate in biotechnological research will be marginalized in the global economy.
- In the Croatian economy there is the threat that innovative companies might become the property of foreigners, which would bring about the "disappearance" of a great deal of newly created capital from the national economy.

The question arises about what can and what has to be done by the Croatian government to ensure better conditions for research, development and innovation activity. However, there is also the question of what enterprises themselves need to do in order to develop their own innovative potentials. On the basis of the present situation in the Croatian economy and the experiences of successful Croatian enterprises, the following measures can be suggested for the Croatian innovation system to become more successful.

The measures are divided into the following groups: (1) measures for ensuring adequate input, (2) measures for ensuring a suitable environment and (3) measures for the improvement of communication.

Measures for ensuring adequate input

1. High quality educated human resources are a precondition for the development of a knowledge society. It is necessary to increase the quality of and access to education in basic sciences, and especially in the area of information sciences.
2. There is a tradition of financing education and research from government sources. However, these resources are still too small. Let us remind ourselves that companies like Pliva and Ericsson Tesla invest more in research and development in the field of technology than the Ministry of Science and Technology. It is questionable whether the total privatization of those sectors would contribute to the development of the Croatian economy.

3. It is necessary to ensure sources for financing technological innovative activity in more cases than now. There is also a need to make efforts in the area of tax exemptions for those companies, so that the return on investment in research and development can be improved. For example, it is possible to introduce tax exemptions for the costs of research and development within a company, because these departments are the greatest stimulating factor for innovation development.

Measures for ensuring a suitable environment

1. It is necessary to simplify the legal procedure for the protection of intellectual property and make it less expensive. It is also necessary to ensure the implementation of that protection. It is estimated that due to the theft of software in Croatia there was a loss of about 4000 jobs, while the companies and the government suffered great harm. Only occasionally are actions conducted to discover "illegal" operations, which have been found in great numbers. It seems that in the mind of a Croatian citizen this is not a criminal act, but something that can be tolerated.
2. Bureaucratic obstacles are also an immense stumbling block for the development of entrepreneurship, which is a basic prerequisite for the development of a knowledge-based company. There is a great need to simplify the procedure of founding an enterprise and to obtain incentives through the HITRA and TEST programmes.
3. Innovators usually have good ideas, but they do not have adequate knowledge to technologically realise their ideas and to commercialise them. In Croatia there is a network of consultants in the company "Technology Park Zagreb". However, the consultant market in Croatia is only in its early stages, and the quality of consultant services is low. Incentives should be given to the founding of a Croatian Society of Consultants which, through its active work, would promote the most important characteristics of consultants described in the third chapter. The following should be ensured: (1) a legal frame to regulate who can perform consultant work, and (2) resources in which the state would participate to a great extent in financing consultant services. Such concrete financial help would stimulate the use of consultant services by investors, which would increase the commercial return on investment from innovations.

4. It is important to stimulate the development of companies directed to growth by enlarging their assortment, winning new markets and improving the quality of new products. Those enterprises are the bearers of innovation, while enterprises focused on reducing costs are concerned mostly with their own survival and do not have the strength for innovative activity.

Measures for the improvement of communication

1. It is important to stimulate cooperation between universities and companies, which can be conducted through the following forms of actions: (1) help in research in the form of financial assistance, equipment and infrastructure, (2) informal cooperation between individuals from industry and science, (3) research commissioned by industrial companies, (4) programmes of exchange of experts, and the education of students in industry, (5) joint research projects partially financed by the government, (6) research consortiums and (7) cooperative research centres.
2. It is recommended to try to increase the awareness of citizens in Croatia of the importance of innovation through promotional programmes, as well as to raise awareness of the measures that support innovation activities. Apart from news in the media about innovative companies, it would be beneficial to organize and publicly promote competitions in which the best Croatian innovative enterprises would be rewarded.

CONCLUSION

The aim of this paper was to analyse the characteristics of the Croatian system of innovation stimulation, and suggest measures for its improvement on the basis of research results on innovative activity in Croatian enterprises and in comparison with the experience of successful countries.

The results of the innovative activity of Croatian enterprises show that the innovative activity of Croatian enterprises is below the level of the countries of the European Union. However, there has been a trend of growth in innovative activity in the last 5 years, so the replies of the respondents to questions on innovation are similar to those in the EU. The majority in the sample work in research and development departments.

Some Croatian enterprises are in the forefront of their counterparts, not only at home, but also over a wider regional scope. Therefore, their experiences were analysed

and it was found that such enterprises have different goals which stimulate them to engage in innovative activity. It was also found that they use different sources of ideas and information for innovative activity in relation to the average Croatian company. These enterprises see innovation as a resource for entering new markets by means of new products, and they mostly rely on buyers and institutionalized sources of ideas and information for innovation. Successful enterprises also give an important role to innovations in forming the development strategy of the enterprise.

On the basis of the research results, we assessed the efficiency of the Croatian system for the stimulation of innovation and concluded that it was not sufficiently prepared for the new challenges of a global information society, particularly because of the: (1) weak activation of resources for innovation, (2) weak institutional support for investments in risk ventures which are potential generators of development, (3) weak diversification of the risk in "entering" a new industry, (4) closing down of existing industries due to the development of new branches of science, such as biotechnology, (5) danger that innovative enterprises become the property of foreigners, which would lead to the "disappearance" of a great deal of newly created capital in the national economy.

On the basis of these conclusions, the experience of countries which are successful in the field of innovations, and the recommendations for the building of a successful innovation system, the following measures to ensure greater success for the Croatian national system are suggested: (1) measures for ensuring adequate input, (2) measures for ensuring a suitable environment and (3) measures for the improvement of communication.

Measures for ensuring adequate input include increasing the quality of and access to education in basic sciences, increasing resources from the state for education and research, increasing allocations of resources in order to finance technologically innovative activity, and also to reduce the tax obligations of innovative enterprises. Measures for ensuring a suitable environment include simplifying and reducing costs in the legal procedure of protecting intellectual property, removing bureaucratic obstacles, stimulating innovators in the use of consultant services that would be partially financed by the government, stimulating the development of enterprises that are directed to growth by enlarging their assortment, by winning new markets and by improving the quality of new products. Measures for improving communication include stimulat-

ing cooperation between universities and enterprises and by increasing the awareness of Croatian citizens of the importance of innovations with the help of different promotional programmes.

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