# **CROATIA AND NEW PROFESSIONS**

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# Abstract

Imbued with the global economic crisis and contemporary trends of technological development, the question is where to find Croatia in relation to the need for the creation of competent human resources in the response to the high rate of unemployment and the need for training for jobs of the future, in order to create the basis for sustainable and inclusive growth and development.

The paper gives an overview of the current state of the Croatian employment and the current demand for occupations, as it points the need for qualifications which would be aligned with the needs of the labor market in the future. The paper also includes contemporary, global trends of technological development and gives a list of potential future jobs as the result of predictions in accordance with these trends.

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# 1. Introduction

The current technologicaldevelopmentproceeded according to the well-known dynamicsstarting from the 2nd half of 18th centurywith the use of steam, generating machine, steamship, railway, etc. This is followed by another technological revolution through the development of electricity, mechanization, telephone, radio, car, airplaneetc. There was a third technological revolution which was marked by the IT specialists through the development of electronics, microprocessor, rocket, television, robot, etc. After that, started a fourth technological revolution which was market by the scientists with the development of photonics, the fusion of atoms, Artificial Intelligence, biotechnology, and is emerging the so-called fifth technological revolutionthat should follow in the near future. It should be marked by the teams of scientists, especially multidisciplinary teams that will seek globally to create scientific preconditions for the knowledge society, learning society, intelligent society, democratic society, a society of equal people, welfare society, a society of sustainable development, etc. (Zelenika; 2011, 83-84)

Contemporary global trends are marked by the rapid technological and scientific development and the accelerating exchange of knowledge.Croatian education system is not enough flexible for implementing the development of changesin study programs in time, and a large number of current studentsacquiresqualifications for occupations that in the near future will no longer exist. The question is where Croatia willbe positioned in this challenge for the training of human resources for the future occupations.

## 2. The actuality of knowledge

Knowledge is a key resource in driving development. It drives the development of techniques, technology and science, which results with the development of economy as a hole. Creating an upgrade of existing knowledge acquired through formal or informal education with the new knowledge is of a crucial importance. Sucha processof continuous learningin conditions of globalizationensures labor force competitivenessin domestic and foreign labor market. To insure the success of above mentioned, it is necessary to define the period of actuality of certain knowledge. It is known that there are basic groups of knowledge that do not change and do not become obsolete during the time. For example there is knowledge from Croatian language, mathematics or physics. On the other hand, there is knowledge that grows through building on the already existing, and well established that is changing in accordance with the technological and science development.Because of this group of knowledge it is important to follow global development trends and create conditions for the implementation of novelty in existing educational system. For easy understanding of actuality of knowledge it will be explained the term of half-life of knowledge.



#### **Figure 1** – Half-life of knowledge

Source: Schüppel, J. (1996.) Wissensmanagement, OrganisatorischesLernenimSpannungsfeld von Wissens-und Lernbarrier. Wiesbaden: DeutscherUniversität-Verlag

Half-life of knowledge implies a time during which half knowledge is being substituted with a new one. (Benčić; 2009, 101) The reason of exchange of the knowledge is obsolescenceof knowledge or falsity of existing knowledge.During the half-life of knowledge it is created more new knowledge than it can vanish. That is how the total amount of knowledge increases.Therefore, the time of observation declining of knowledge should be limited to the time interval of half-life of knowledge... The definition of half-life of knowledge does not imply that knowledge decreases exponentially. (Benčić; 2009, 101)

Figure 1 shows a graph that indicates the trend of decliningof the relevance of knowledge in time in relation to the type of knowledge acquired. It is evident from the Figure 1 that knowledge in the field of information technology (IT), technology and professional knowledge, and knowledge acquired in higher education have exponential decreasing trend, in relation to school knowledge that has a linear trend. Around 50% of IT knowledgebecomes obsolete after a year and a half, technological after three, andprofessionalafter five years. 50% of tertiary knowledge becomes obsolete after twelve and school knowledge after twenty years. Fully obsolescence of IT knowledge appears after nine and technology after twenty years. Approximately 10% of professional, 30% of tertiary and 50% of the school knowledge, remains real even after twenty years.

Half-life of knowledge in the most fields lasts from two and a half to four years. (http://www.hzz.hr/default.aspx?id=11946, access: 21-02-2014)It can be concluded that it is extremely important to determine the time intervals in the global development of science and technology, strive to anticipate changes and systematically create conditions for the implementation of changes, both in education and in raising the level of infrastructural equipment.

Technological and scientific development occurs in even shorter time interval compared to previously recorded, and the impact it has on the individual areas is significant and has an ever-expanding range of effects that are not limited to just one field of science. For example, the development of applied research in medicine made it possible to cure certain diseases from which people earlier died, the development in technology has enabled modern transport equipment, which improved the quality of human life, etc.Over time, the result of this development has proven to be in a growing number of populations in the Earth, among them a large number of older populations. With the increase of populationproblems emerged in the absence of food, resulting in resorting to genetically modified food, and also inthe absence of energy, which were launched researches of the possibility of using alternative energy sources. Increasing of pollution, which affected the enormous global climatic disturbances, has been also the result of all this development activities, etc.

Every development made some changing and any change fostered the need for new knowledge and new training for the challenges of the future.

The measure used to evaluate the development of the country is covered by the Global Competitiveness Index which is in detail discussed in the sequel.

### 3. The Global Competitiveness Index of Croatia

The Global Competitiveness Report is written by the World Economic Forumbased on twelve criteria called twelve pillars of competitiveness, and they define competitiveness as "set of institutions, policies and factors that determine the level of productivity of a country...The concept of competitiveness thus involves static and dynamic components. "(Schwab; 2013, 4) GCI includes a weighted average of many different components, each of which measures a different aspect of competitiveness and also includes long-term and short-term period. GCI includes three stages of development of the country:

- first stage represents factor driven economiesand is contained of the first four pillars,
- second stage represents efficiency driven economies and is contained of the next six pillars, then follows the
- third stage that represents innovation driven economies and is contained of the last two pillars of competitiveness.

Figure2shows thestructure of the Global Competitiveness Indexaccording to the stages listed.



# Figure 2 – The Global Competitiveness Index framework

Source: Schwab, K. (2013.), The Global Competitiveness Report 2013 – 2014, World Economic Forum, Geneva, p. 9

According to the latest Global Competitiveness Index Report Croatia is defined as an economy that is in transition between the second and third stage of development, along with 22 other countries, among which is located in the sixth place. (Schwab; 2013, 11) In the overall ranking of 148 countries, Croatia is ranked in 75th place in 2013, with an average score of 4.13 in a scale of 1 to 7. In the sub index of basic requirements Croatia took a 61st place with the score 4.69.In the sub index ofefficiency enhancers Croatia took a 68th place with the score 4.05, and ultimately in a sub index of innovation and sophistication factors Croatia took an80th place with a score 3.46. (Schwab; 2013, 17) A detailed view of the Global Competitiveness Index of Croatia in the year 2013 is shown in Table 1.

Table 1 demonstrates that Croatia is the best developed in health and primary education which are included in factor – driven economies and weakest in the innovation which is included in innovation – driven economies.

The highest average score is the set of indexes in the first stage of development, and the lowest is the set of indexes in the third stage of development of the country. As the highest grade is 7, it is evident that in front of Croatia isa lot of work and undertaking for better positioning among developed countries. Higher education and training index is rated with the score 4.53 and the percentage of highly educated population according to the census of year 2011 is 16.4% (http://www.jutarnji.hr/template/article/article-print.jsp?id=1116540, access: 21-02-2014).

GCI	Pill	Pillars		Score (1 - 7)		Key for	
Basic requirements	1	Institutions	93	3,60		Fo stor	
	2	Infrastructure	42	4,66	4,69	driven economy	
	3	Macroeconomic environment	68	4,71			
	4	Health and primary education	66	5,80			
Efficiency enhancers	5	Higher education and training	51	4,53	4 05	Efficiency- driven economy	
	6	Goods market efficiency	111	3,92			
	7	Labor market efficiency	114	3,94			
	8	Financial market development	78	3,90	4,05		
	9	Technological readiness	45	4,41			
	10	Market size	74	3,59			
Innovation and sophistication factors	11	Business sophistication	88	3,81		Innovation-	
	12	  Innovation	79	3,12	3,46	driven	
			-	-,		economy	

Table I – GCI Croatia 2013	Tab	le 1	– GCI	Croatia	20	13
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Source: Author by Schwab, K: "The Global Competitiveness Report 2013 – 2014", World Economic Forum, Geneva, 2013

This situation does not provide a development perspective with which Croatia would gain a comparative advantage over other European countries, as it lags considerably in the number of highly educated population.Currently, the European average is 30 percent, and by 2020 the planis to achieve a result of 40 percent of the highly educated at the European level. (http://www.mojfaks.com/vijesti/zemlja-znanja-i-obrazovanja-gdje-se-nalazi-najvise-i-najmanje-obrazovanih-hrvata, access: 21-02-2014)Innovation should be partially initiated also from the field of higher education. It is shown that the innovating index is rated 3.12. The number of patent applications in Croatia in the year 2012 totaled 249, and is a decline of 1% of patent applications in relation to the year 2011. (DZIV; 2012, 25). 2011 was reported 251 patent, as compared to 2010 accounted for 10% less. (DZIV; 2011, 33-34)From these data it is evident that innovation declines, although there is a growing number of a highly educated population in Croatia.

### 4. Contemporary trends in the Croatian employment

Currently most requested jobs in the Croatian labor market are: waiter, chef, salesman, graduated economist, cleaner, kitchen worker, educator, chef assistant, a lawyer and a hair stylist. (http://burzarada.hzz.hr/Default.aspx, access: 03-03-2014)

The unemployment rate in December 2013 was 21.6%. (CES, 2014, 4)In the educational structure of the unemployed were the most numerous people with secondary vocational school for up to three years and schools for skilled and highly skilled workers (33.9%), followed by those with secondary professional school for 4 and more years and gymnasium (28.9%), people with primary education (20.4%), people with university and postgraduate degrees (6.5%), people with no schooling and primary education (5.1%) and people with the first college degree, college education and professional studies (5.1%). (CES, 2014, 4) It is evident that the unemployment rate is very high, and that the largest share of the interest rate is related to secondary education, which is not surprising because the proportion of the population in the Croatian educational structure, is also the largest. The percentage of unemployed with a university degree is also high considering that Croatia has only 16.4% of highly educated population.

Even more disheartening is the fact that 43% of the workforce in the EU does not have the qualifications to what employers are looking for today. The number of unemployed is increasing, and the stagnation of the economy is still present.All these negative trends are affecting the decrease in employment.Change is inevitable, and education and knowledge are the key factors that can change things. The future of the Croatian labor market cannot be accurately predicted, but can suggest some trends. Due to the aging of the nation the working life will extend and thus will get to extend the duration of career. Therefore, it is important for employers to invest in their people and their education. The demand for workers who perform routine tasks will reduce and these jobs will be taken by the automatization, technology and robotics. For such work it will be required workforce that has the competence to manage the technology and in the future will be an emphasis on workforce with digital competencies and ICT occupations. (http://eskills.hr/?p=550, access: 28-10-2013)

#### 5. New professions

Global trends in scientific and technological development points to the fact that some occupations are vanishing andthose which still exist today will vanish till year 2025. It is emphasized the importance of knowledge and knowledge application, lifelong learning and investment in employee training, creating special laws for the effective regulation of part-time study and various continuing education programs.

Some analysts of the labor market predict that will grow the future demand for workers in the field of health, science and technology, and it is anticipated that the new global jobs will be opened specifically for the production of organic food, microbiology, computer biology, genetics, robotics, nanotechnology, space technology, advanced medical services and etc. In accordance with the above mentioned, it is important to plan educational programs to keep pace with technological development and create a staff of trained and prepared human resources for the future. Trends show that the emphasis will be on technology and natural-oriented professions, which will have an increasing dominance in the global labor market. (http://eskills.hr/?p=550, access: 28-10-2013)

According to the previous researches it is made a list of the potential future occupations. These are: a lawyer for virtual property, house coordinator for children's education, professional friend, an expert in cataclysm, death coach, traceability manager, architect of the body, 3D construction worker, consultant for simplicity, broker for online education, and occupations in the field of health services. (http://www.jutarnji.hr/zanimanja-buducnosti--nasa-djeca-bavit-ce-se-svemirskom-tehnikom--pomagat-ce-umirucima-i-proizvoditi-organe/1019089/,access: 28-10-2013)It is obvious that the future demand for occupations will be based on ICT technology and literacy, and that the technological and scientific development in the future will produce enormous changes in the labor market and society in general.

## 6. Conclusion

According to previous researches of technological and scientific development, it is evident that we are entering in a time of a new technological revolution. Knowledge is changing at an increasing pace and only in a few years there will be a modification of the acquired knowledge which points to the growing need for lifelong education and training of human resources.

Croatia is a country situated in the transition from the second to the third stage of development according to the Global Competitiveness Index, which is assessed as 4.13 out of a maximum possible score 7.

To maximize its business sophistication and innovation, Croatia needs to develop more effective interinstitutional cooperation that will facilitate the smooth flow and acquisition of new knowledge and its application in the development of its own know-how.

The current state of the Croatian labor market indicates a very high unemployment rate. Among them is the high percentage of people with tertiary education. It has been established that it is necessary to invest in knowledge and competence in the field of ICT because of the insufficient computer literacy and use of this technology without which it is impossible to imagine a workplace in the future.

Occupations that could occur in the near future are in the area of technological and natural-oriented professions. The educational system of Croatia has to face great challenges and the changes are happening in even shorter time interval. It is necessary to establish a systematic model of managing these changes and their implementation in order to ensure Croatia sustainable and inclusive growth and development in the future.

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