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Jeleč Raguž, Mirjana

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Mirjana Jeleč Raguž
Polytechnic of Požega
Vukovarska 17,
34000 Požega, Croatia
mjelecraguz@vup.hr
Phone: +38534311454

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Abstract

The aim of this paper is to present results of empirical research on regional orientation and engagement of Croatian higher education institutions (HEIs). The second goal is to research if there is any difference between Croatian universities and polytechnics in their regional focus. Contribution to regional economic, social and cultural development of a region is a recent mission that is, in addition to education and research, imposed on HEIs. With the establishment of public polytechnics across the country, the Republic of Croatia has adopted a new mission of HEIs, and has established them with the aim of contributing to regional development. Such institutions should, in comparison to universities, be more regionally oriented, i.e. offer study programs and research needed by the regional industry. Since the differences between universities and vocational studies are not clearly defined by the law in Croatia, referred orientation should be a component of distinction. For the purposes of this paper, a sample of Croatian public university constituents and polytechnics was defined. A questionnaire was drafted and sent to the relevant persons at the HEIs. Research results and statistical tests indicate that there is no statistically significant difference in regional orientation and engagement between universities and polytechnics. Further research in this area will seek to contribute to raising awareness of the HEIs and of the economic policy carriers regarding the differentiation of the HEIs and to encourage the implementation of the regional mission of Croatian polytechnics, particularly through external evaluation.

Keywords: Universities, polytechnics, differences, regional engagement, the Republic of Croatia

1. *Introduction*

The main objective of this paper is to present the results of the empirical research on regional orientation and engagement of Croatian higher education institutions (HEIs). The second goal is to research if there are any differences between Croatian universities and polytechnics in their regional mission and focus. Contributing to the economic, social and cultural development of the region is a new mission that, in addition to education and research, has been set before tertiary institutions. The stated mission includes active cooperation with the private and public sectors in the region in order to stimulate innovation and development. The development of the third mission was due to the expansion of higher education that included an increase in the number of students and higher education institutions, as well as an increase in staff and public investment in tertiary education, which is why it was necessary to justify the increased investment. With the Higher Education Act (Official Gazette 96/93, 34/95, 48/95, 29/96, 54/96, 59/96, 129/00, 78/03 – Authoritative Interpretation)[1] from 1993, the Republic of Croatia has set the foundations of a binary system of higher education by which higher education in Croatia is acquired through both universities and vocational

studies. With this, Croatia accepted the European trends in higher education and in the second half of the 1990s it began with the establishment of new HEIs, the so-called polytechnics, which is an important novelty in relation to the former unitary system of higher education (universities only). In addition, respecting the obligation to adjust legislation in the field of higher education with the European standards, in 2003 Croatia adopted a new Scientific Activity and Higher Education Act (Official Gazette 123/03, 198/03, 105/04, 174/04, 46/07, 63/11, 94/13, 139/13, 101/14, 60/15)[2], by which the Republic of Croatia has continued to apply and has further expressed more institutionally and substantially its tendency to establish university studies within the framework of universities and professional studies within the framework of polytechnics and colleges.

The justification of Croatian diversification of the HEIs, their regional engagement and orientation, and whether there is a difference between them in the field of regional engagement, is a question which this paper has tried to answer. For the purposes of this paper, the empirical research was conducted in 2016 (July) on Croatian public HEIs. The research subject was the regional orientation and engagement of the Croatian HEIs, their involvement in the field of cooperation with regional economic and public entities, and the potential difference between Croatian universities and polytechnics. The methodology used for the presentation of research results includes descriptive statistics, the Chi-square test and the Wilcoxon runk-rum test (Wilcoxon Mann-Whitney U-test, or WMW test).

The research task in this paper was to verify the assumption that between different HEIs there is no visible difference in their primary orientation towards the regional, national and international labour market, from the perspective of scientists. The above is set as a research task since Croatia is harmonizing its higher education system with European standards, but the differences between university studies, which are offered at universities and vocational studies, which primarily should be offered at polytechnics are still not legally fully defined. The basic problem is that there is a mixed system of higher education and different types of institutions in the Republic of Croatia, but their basic difference is not known nor is it recognized in the labour market. According to the practice in some European countries (such as Finland, the Netherlands, Germany and Austria)[3] that have a binary system of higher education, the differentiation of these institutions lies in their primary (but not exclusive) orientation, whereas universities are focused more nationally and internationally, and polytechnics are focused more regionally. The emphasis on vocational studies is on expert and practical education that meets the needs of the region in which they are established, as opposed to universities which are more nationally and internationally oriented and place an emphasis on academic education and basic research.

This paper is structured in four chapters. In the introduction, the problem and the subject of research, objective and basic hypothesis of the paper are defined. The second chapter presents the scientific and professional literature in the wake of researching regional functions of higher education institutions and the interaction between scientific and economic sectors. The third chapter presents an analysis of the results of empirical research conducted in the Republic of Croatia on a sample of public universities and polytechnics, while the final chapter is dedicated to conclusions.

2. *Theoretical Bases of Development of Regional Functions of Higher Education Institutions and Literature Review*

Institutions of higher education (HEIs) have traditionally performed two main tasks. One of the tasks was related to *research* and the other to *education.* With certain exceptions, such institutions have mainly been independent and focused on the creation and development of knowledge essential for basic and applied research in the field of national and global economy. Meeting local and regional needs has not been taken into account. Recently, the situation has changed. HEIs are faced with another important task, *to contribute to the economic, social and cultural development of the region* in which they are located via open collaboration with stakeholders from the private and public sectors. Hence, these institutions are no longer expected to ensure only education and research. They are expected to cooperate with economic entities and to be substantially more actively engaged in the development of the region. Although HEIs are located outside the major urban centres and have in a certain way contributed to the development of the region, in terms of human capital development, employment and the impact on employment and income in the region, such a passive impact on the development of the region nowadays is no longer sufficient. It is

necessary that these institutions become the engine of regional development through contribution to economic innovation, i.e. by connecting with key stakeholders in the region, especially with the private and public sector.

Decentralization and the establishment of new institutions has led to the geographical spread of the higher education offer in an effort to maintain the spatial distribution of the educated population and to achieve a balanced regional development and improve regional access to higher education. The consequence of that is the diversification of HEIs with a complex variety of universities, colleges, regional colleges and professional educational institutions in which the various institutions imposed different responsibilities towards society. The regional role varies depending on the type of institution. In some countries, for example, universities are more nationally and internationally oriented while polytechnics or universities of applied research are more oriented towards meeting local, i.e. regional needs (for example in Finland, the Netherlands, Germany or Austria)[3].

The influence of HEIs through cooperation with the business sector on regional innovation and development is generally analysed in the literature using the *regional innovation systems* concept (OECD, 2007: 124). The Regional Innovation System (RIS) is a relatively new concept that first appeared in the early 1990s. It appeared a few years after the Briton Christopher Freeman first used the concept of the innovation system. He used this concept in the analysis of the growth of the Japanese economy (Freeman, 1987), approximately at the same time when the idea of a national innovation system appeared, thanks to textbooks written by the Swedish economist Beng-Åke Lundvall (1992) and the American economist Richard R. Nelson (1993). The author who published the first serious study of the regional innovation system and thus created the concept of RIS was Philip Cooke, a professor at the University of Wales (UK), in his papers from 1992 and 1993 (Cooke, 2008: 395).

To better understand the concept of RIS, it is necessary to take a step back and explain the concept of *the national innovation system* (NIS). The concept of the NIS is the upgrading of the endogenous model of economic growth. The NIS emphasizes the role of endogenous factors in economic growth, however, it is not just R&D and education themselves (linear model of innovation). It emphasizes innovation as a driver of social and economic development, and stresses the importance of interactive learning and collaboration (interactive model of innovation) between science and economy. The NIS stresses the importance of a legal, economic and institutional framework which contributes to fostering cooperation. The essence of the innovation system is the development of a framework that encourages the interaction of science, government and economy in order to increase innovation in society and the economy. The main feature of the concept is that the economic ability of innovation depends not only on the activities of certain entities (companies, universities, research institutes, government institutions, etc.), but it depends on how these entities cooperate as parts of the system.

The Regional Innovation System (RIS) is a logical sequence of the economic theory development, since long distances reduce the possibility of cooperation between scientific institutions and businesses. The RIS completely departs from the national innovation system (NIS), but stresses the importance of a region as an appropriate economic space which, due to physical proximity, increases the possibility of frequent interaction between scientific, public and private sectors. Literature on the RIS has developed as a result of the analysis of a number of regions that have proven their success. In the literature, these regions are named differently, but they have the same meaning, such as knowledge regions, learning regions, innovative regions, high-tech regions, clusters, industrial districts, regional innovation systems etc. Examples of such regions from the 1990s are Silicon Valley, Emilia-Romagna and Baden Wuerttemberg (Asheim, Jan, 2006: 28).

The RIS has no generally accepted definition. It can be defined as a system that includes a group of organizations, such as educational institutions, local and regional self-government units and economic organizations that encourage cooperation and innovation in the region. Cooke has defined a regional innovation system as a set of public and private institutions that systematically engage and encourage companies in the region to adopt common standards, expectations, values, attitudes and practices, which encourage innovation culture and process of knowledge transfer (Cooke, Memedovic, 2006: 4).

The presented literature review justifies an increase in importance of new, regional tasks of the HEIs. In addition, the meaning and significance of the RIS was presented, as a concept which explains the need to include the HEIs in the regional economy. Motivated by the importance of cooperation be-

tween the HEIs with regional economic entities and public authorities, in this paper the set goal was to examine whether the Croatian tertiary institutions are aware of their third mission and how they assess their regional focus and engagement. The next task was to research if there is any difference in implementing the regional role between universities and polytechnics in Croatia. In the recent international scientific literature, some papers with a similar but not the same topic can be found. Jaeger and Kopper (2014) wrote about the potential of the third mission of the HEIs. They investigated a differentiation between the HEI-region-fit of universities of applied sciences (*polytechnics*) and universities in Germany. They proved that universities of applied sciences (polytechnics in Croatia) actually focus on the regional employment structure more strongly than universities.

There are some more papers that indicate that the regional role varies depending on the type of institution. According to them, for example, universities are more nationally and internationally oriented, while polytechnics are more oriented towards meeting local, i.e. regional needs (for example Pfeffer (2000)[4], Schreiterer and Ulbricht (2009)[5]). Furthermore, there are some studies which emphasize the regional task of polytechnics in relation to universities, for example, a study of the Ministry of Education of Finland (2005)[6], the OECD (2007)[7], the City of Rotterdam Regional Steering Committee (2009)[8], and the European Commission (2014)[9]. For example, the Report of the European Commission (2014) indicates that research intensive HEIs (universities in Croatia) collaborate with companies, bigger firms and high-tech companies and have much international collaboration, and other HEIs collaborate with local employers and small and medium companies (SMEs) and just some national/international collaboration in niche areas (European Commission, 2014: 17).

In Croatia, the subject of this paper has not been investigated in the way it is investigated in this paper, which shows a lack of interest in this important topic. Regarding Croatian authors who have generally written about the collaboration of the scientific and economic sectors, we should mention Radas (2005), who in her work described the results of research into the motives of entrepreneurs in cooperation with scientific community, satisfaction with the cooperation and how the same affects selected innovation indicators. Švarc (2001) wrote about the national innovation system and has concluded that the existing R&D system in Croatia is characterized by a lack of infrastructural institutions, financial instruments, programs and state policy incentives which aim to improve the partnership of science and industry and the commercialization of research results (Švarc, 2001: 1067).

What can be concluded from the presented literature overview is that scientists, given the importance of the topic, have so far insufficiently addressed the subject. The empirical part of this paper, presented below, aims at providing further contribution to the development of Croatian scientific thoughts regarding the regional mission of the HEIs. Then there will be discussion on the binary (mixed) system of higher education, the interaction of the aforementioned entities with the public and private sectors, and the potential difference in orientation towards regional / national / international labour market between the different HEIs.

3. Methodology and Empirical Research Results

3.1 Methodological Research Framework

The Empirical research for the purposes of this paper was conducted in 2016 (July) in the Republic of Croatia. For that purpose, a research was conducted on samples composed of Croatian public HEIs. Highly structured questionnaires were used as the survey instrument. The survey and questionnaire have been prepared after a thorough review of the scientific and professional literature. The total number of public HEIs in Croatia, at the time of the research was 96 (82 faculties and departments, 11 public polytechnics and 3 public colleges). Certain faculties (total of 26) have been excluded from the sample, because of their affiliation to a particular scientific field. They have no function to contribute to the development of economic subjects (e.g. Humanities, Biomedicine and Health). Of the total number of Croatian public HEIs, the population related to the research in this paper, amounts 70 HEIs, with 30 who returned fully answered questionnaires, which makes 43% of the researched population. The questionnaire was sent at the level of the HEIs to individuals performing vice-dean functions. They were mainly vice-deans for cooperation with industry and business development, since they should be best informed on this matter. If within the institution there was no such function, the questionnaire was addressed to vice-deans for research. The sample structure is presented in Table 1.

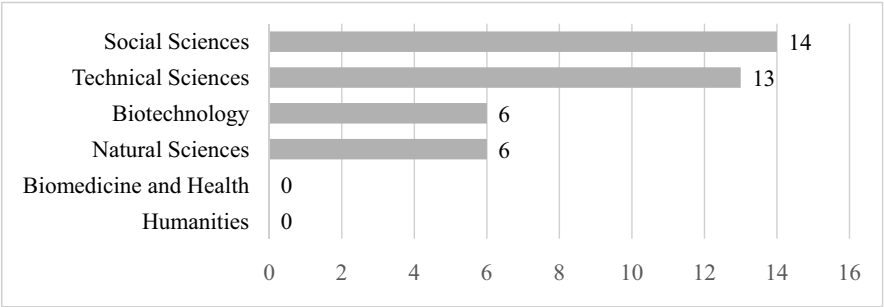
Table 1 Structure of surveyed public higher education institutions (HEIs) according to type

	Survey Respondents	Share (%)
University constituents (Faculties)	21	70
Polytechnics	9	30
Total of Survey Respondents	**30**	**100**

Source: Results of the empirical research

The questionnaire was sent to public HEIs regardless of their scientific area (apart from the mentioned excluded areas). The structure of the HEIs, according to scientific area, can be seen in Graph 1.

Graph 1 Respondent HEIs according to scientific area (in absolute numbers)



Source: Results of the empirical research

As it is presented in Graph 1, most respondents are from the Social Sciences. It should be noted that some institutions, in accordance with their interdisciplinary nature, cited affiliation to more scientific areas (mainly polytechnics). As it has been mentioned before, there are no respondents from the scientific fields that include the Humanities and Biomedicine and Health.

The research task was to verify the assumption that there is no statistically relevant difference between universities and polytechnics in their primary orientation towards regional, national or international labour market, from the perspective of scientists. The difference in the primary orientation towards a different labour market is the practice in some European countries, which has already been discussed.

3.2 Empirical Research Results

Although the third mission of the HEIs is unquestionable and was articulated many times in scientific and professional papers, the problem arises when the contribution to regional development needs to be measured, i.e. expressed qualitatively and quantitatively. There is no consent on how to measure the contribution of scientific institutions to regional economic development. While the general cooperation of science and industry is measured by indicators such as the number of innovations that the cooperation has produced, the number of registered patents, the number of contractual research, scientific research funding, work on joint projects etc., the contribution of scientific institutions to regional economic development is much harder to measure and evaluate. Therefore, for the purposes of this paper, an empirical research on samples drawn up by public HEIs was performed in order to examine their views on the observed subject and in order to answer the question whether there is a difference in the regional orientation between the tested institutions; what is their regional engagement in the field of cooperation with entities in the private and public sectors in the region and how they assess their impact on regional economic development. The presented study results represent the views of respondents.

One of the indicators of **regional orientation** of HEIs is representation of contribution to the development of the region within the framework of the mission / objectives / strategy of the HEIs. Respondents' answers are presented in Table 2.

Table 2 Contribution to the development of the region within the framework of the mission / objectives / strategy of the HEIs

	University constituents (Faculties)	Share (%)	Polytechnics	Share (%)
Included	18	85.7	8	88.9
Not included	3	14.3	1	11.1
Total of Survey Respondents	**21**	**100**	**9**	**100**

Source: Results of the empirical research

The share of polytechnics in the analysed sample (total of 9 surveyed polytechnics), which in strategic documents have represented a regional mission, amounts to 89%, and the share of such university constituents in the total number of analysed institutions amounts to 86%. It follows, according to the analysed sample, that polytechnics, as newer institutions, do not have a more represented regional mission in their strategic documents. This is not in accordance with the aforementioned trends in countries such as Finland, Germany, Austria and the Netherlands, where the HEIs of a vocational character were established in smaller communities and are more regionally oriented than universities.

Participation of scientific institutions in the regional economic development is also reflected in cooperation with regional stakeholders in drafting policy documents. On the one hand, the development of strategic documents of HEIs should include stakeholders from the private and public sectors, as it is necessary to include the HEIs in preparation of regional development documents. The latter is especially important for smaller communities, where strategic planning has a major role in terms of furthering its economic, social and cultural development.

Table 3 Participation of regional private and public sector entities in developing the HEIs' strategy

	University constituents (Faculties)	Share (%)	Polytechnics	Share (%)
Yes	6	28.6	5	55.6
No	10	47.6	1	11.1
I do not know	5	23.8	3	33.3
Total of Survey Respondents	**21**	**100**	**9**	**100**

Source: Results of the empirical research

Table 4 Involvement of HEIs in developing local / regional development strategies

	University constituents (Faculties)	Share (%)	Polytechnics	Share (%)
Yes	7	33.3	8	88.9
No	8	38.1	1	11.1
I do not know	6	28.6	0	0
Total of Survey Respondents	**21**	**100**	**9**	**100**

Source: Results of the empirical research

Orientation towards the region in which the institution is located is visible in drafting development plans of the institution. Listening to the needs of the region, according to the analysed sample, is more visible among Croatian public polytechnics, since 55.6% of them involved public and private entities from the region in developing their own strategic documents, as well as 88.9% of them were in-

volved in the development of strategic documents of a county in which they are located. Cooperation in drafting policy documents is much less present among university representatives.

In order to develop the HEIs with exclusively professional studies in the direction of contributing to regional development, it is necessary to have a leadership that is aware of the third mission of higher education and the environment in which they are located. The awareness of the current leaders of such institutions regarding the third mission is presented by the data in Table 5. The main orientation of university constituents, according to the results from the table, is towards both the regional and national labour market, which is an acceptable response. However, of 9 participating polytechnics, only three (3) institutions have indicated that their primary interest lies in the needs of the regional labour market. The question was not exclusive in character. The aim was to gain insight into the primary orientation, which of course is not, and cannot be, exclusive. The leadership of the aforementioned institutions is not sufficiently aware of the basic purposes of establishing polytechnics around Croatia which should be working towards regional economic and social development. The above is not surprising, since the Croatian national policy on higher education does not sufficiently distinguish the observed institutions. There is a lack of explicit regional dimension in the Croatian strategic and legal framework, and the regional engagement is not set as a primary objective and the HEIs are left to make their own decisions.

Table 5 Primary orientation towards regional or national labour market's needs according to the type of HEIs

	University constituents (Faculties)	Share (%)	Polytechnics	Share (%)
Orientation towards regional labour market's needs	6	28.6	3	33.3
Orientation towards national labour market's needs	3	14.3	0	0
Orientation towards both regional and national labour market's needs	12	57.1	6	66.7
Total of Survey Respondents	**21**	**100**	**9**	**100**

Source: Results of the empirical research

One of the indicators determining the regional orientation of the HEIs is the offer of study programs and adult education programs in accordance with the actual economic needs of the region. For this reason, the respondents answered the question whether their study programs respond to the needs of the regional labour market. Results are presented in Table 6.

Table 6 Compatibility of study programs offer with the needs of the regional economy

Do your study programs correspond to the needs of the regional economy and regional labour market?	University constituents (Faculties)	Share (%)	Polytechnics	Share (%)
Yes	15	71.4	5	55.6
No	1	4.8	0	0
Only partially	5	23.8	4	44.4
Total of Survey Respondents	**21**	**100**	**9**	**100**

Source: Results of the empirical research

More than half of all respondents responded "yes" to the question. Regarding polytechnics, the share of those who affirmatively answered the question is 55.6%. Analysis of the regional labour market should be a normative prerequisite when establishing new professional studies at polytechnics. In Austria, for example, every curriculum, according to the Law of University Studies, prior to the estab-

lishment and implementation, must be presented, not only to the Ministries and Governments of Federal Provinces as employers, but also to associations of industries, chambers of commerce and individual relevant chambers of professions, or other organizations relevant as sectors of economic activity and professions. Those organizations are to submit propositions of change within a certain period of time (European Commission and Federal Ministry of Economy and Labour of Austria, 2001: 52)[10].

The pre-analysed indicators (Tables 2-6) are in the function of testing the assumption about the regional orientation of tertiary institutions and the difference that in this area exist between them. The next three questions, or indicators, speak about the **regional engagement** of Croatian HEIs, and they will be used to test the difference in regional engagement between those two types of tertiary institutions.

The indicator that best indicates about cooperation of the scientific and economic sectors is the number of joint projects. The values of the mentioned parameters are presented in Table 7.

Table 7 Realized projects (scientific, professional, EU projects), 2014-2016

	University constituents (Faculties)		Polytechnics	
	Total	**Average per faculty**	**Total**	**Average per polytechnic**
Total number of realised projects	120	7.5	36	4
Total number of realised projects in collaboration with industry	46	2.9	18	2
Total number of realised projects in collaboration with regional industry (within the county and neighbouring counties)	36	2.2	15	1.7
Total of Survey Respondents	**16**		**9**	

Source: Results of the empirical research

According to the indicators in Table 7 we can see that the share of projects implemented in cooperation with regional economic entities in the total number of such projects (in collaboration with industry) at the university level is 78.3%, while at the level of polytechnics it amounts to 83.3%. In either case, cooperation on projects with regional entities is quite high, especially at the level of polytechnics.

The average score for an institution's contribution to the economic development of the region, its strategic direction, social and cultural development, human resources development and regional innovation is presented in Table 8.

Table 8 The average score for contribution of the HEIs to selected components of regional development (1 not existed, 2 small, 3 medium, 4 high, 5 extremely high)

	University constituents (Faculties)			Polytechnics		
	$\overline{X}$	M_o	M_e	$\overline{X}$	M_o	M_e
Development of human capital in the region	4.2	4	4	3.3	3	3
Employment in the region	3.9	4	4	3.2	4	3
Social and cultural development of the region	3.5	3	3	3.4	4	4
Strategic direction of the regional development	3.5	4	4	2.9	3.4	3
Development of economic entities in the region	3.4	3.4	3	2.8	3	3
General economic development of the region	3.4	3	3	3.1	3	3
Total of Survey Respondents	**21**			**9**		

Source: Results of the empirical research

The average contribution score of the mentioned components of regional development at the level of polytechnics is 3.1, and at the level of universities it is 3.65. The best score at the level of both samples was given to the component of contributing to the development of human capital in the region, and the worst score was given to the contribution to development of companies in the region. However, it is the impact of cooperation on innovativeness of companies that is the indicator of regional economic development and the third mission of the HEIs is expressed through it.

3.3 Statistical testing of the hypothesis

On the basis of the analysed responses by scientists from examined polytechnics, it is difficult to make a final conclusion on the regional engagement and orientation of higher education institutions as well as the differences that exist between them. **Regional orientation** was tested through several segments: the representation of the regional mission in the strategic documents of HEIs; involvement of relevant stakeholders from the private and public sector in institutions' strategic thinking; the involvement of institutions in drafting local development strategies; performed analysis of needs in the regional labour market before offering new study programs (compatibility of study programs and regional needs) and through their primary orientation (towards regional or national labour market, or both). **Regional engagement** was tested through direct cooperation with regional economic subjects in joint projects, the assessment of their own regional engagement and regional orientation and evaluation of the contribution of HEIs to selected components of regional development.

The research task in this paper was to verify the assumption that from the perspective of scientists, there is no visible difference in the regional orientation and engagement, between the different HEIs. In this part of the paper the goal is to test the null hypothesis or the hypothesis which states that there is no statistically significant difference according to the subject of research between two independent samples, polytechnics and universities. For testing the hypothesis the Chi-square test and Wilcoxon-Mann whiney U-test (WMW test) were used.

The difference in **regional orientation** between Croatian universities and polytechnics is visible in certain segments. Polytechnics frequently involve regional stakeholders when drafting their own development documents, as they are more frequently involved in drafting county development strategies than universities. But, in other parameters of involvement, that difference is not visible. Measured by the indicators visible in Table 9, the statistically significant difference in regional orientation is tested.

Table 9 Regional orientation of the HEIs measured by selected indicators (share (%) of confirmative answers)

	Indicator	University constituents (Faculties)	Polytechnics
		Yes (%)	Yes (%)
1.	Included regional contribution in relevant institutional strategic documents	85.7	88.9
2.	Included regional private and public sector in development of HEIs' strategic documents	28.6	55.6
3.	Involvement of HEIs in developing regional development strategies	33.3	88.9
4.	Primary orientation towards the regional labour market's needs	28.6	33.3
5.	Compatibility of study programs with regional economics' needs	71.4	55.6
	Total of Survey Respondents	**21**	**9**

Source: Results of the empirical research

For testing the difference between the two analysed samples, according to the parameters indicated in Table 9, the Chi-square test is used. If Prob>0.05, then difference between categorical variables is not statistically significant and the proportions are not different. The results for each indicator are shown in tables as follows.

Table 10 Included regional contribution in relevant institutional strategic documents (1)

Statistic	DF	Value	Prob
Chi-square	1	0.0549	81.47%
Likelihood Ratio Chi-square	1	0.0566	81.19%
Mantel_Haenszel Chi-square	1	0.0531	81.77%

Source: Results of the empirical research

Conclusion: There is no difference in proportion between the two types of HEIs according to indicator 1 which describes the contribution to the development of the region within the framework of relevant institutional strategic documents. The test was performed at a significance level of 5%.

Table 11 Included the regional private and public sector in development of the HEIs' strategic documents (2)

Statistic	DF	Value	Prob
Chi-square	1	1.9754	15.99%
Likelihood Ratio Chi-square	1	1.9368	16.40%
Mantel_Haenszel Chi-square	1	1.9095	16.70%

Source: Results of the empirical research

Conclusion: There is no difference in proportion between the two types of HEIs according to indicator 2 which describes participation of the regional private and public sector in developing the HEIs' strategic documents. The test was performed at a significance level of 5%.

Table 12 Involvement of HEIs in developing regional development strategies (3)

Statistic	DF	Value	Prob
Chi-square	1	7.7778	0.53%
Likelihood Ratio Chi-square	1	8.5763	0.34%
Mantel_Haenszel Chi-square	1	7.5185	0.61%

Source: Results of the empirical research

Conclusion: There is difference in proportion between the two types of HEIs according to indicator 3 which describes involvement of the HEIs in development of regional development strategies. The test was performed at a significance level of 5%. But, it is necessary to mention that a reason for that difference, maybe lies in the fact that a large proportion of the universities respondent responded "I do not know" (6 of them, while at polytechnics, none of the respondents said that they did not know the answer to this question).

Table 13 Primary orientation towards the regional labour market needs (4)

Statistic	DF	Value	Prob
Chi-square	1	0.0680	79.42%
Likelihood Ratio Chi-square	1	0.0673	79.53%
Mantel_Haenszel Chi-square	1	0.0658	79.76%

Source: Results of the empirical research

Conclusion: There is no difference in proportion between the two types of the HEIs according to indicator 4 which describes institutional primary orientation towards the regional labour market's needs. The test was performed at a significance level of 5%.

Table 14 Compatibility of study programs with regional economics' needs (5)

Statistic	DF	Value	Prob
Chi-square	1	0.7143	39.80%
Likelihood Ratio Chi-square	1	0.6982	40.34%
Mantel_Haenszel Chi-square	1	0.6905	40.60%

Source: Results of the empirical research

Conclusion: There is no difference in proportion between the two types of HEIs according to indicator 5 which describes compatibility of institutional study programs with regional economics' needs. The test was performed at a significance level of 5%.

After testing the assumption that there is no difference in **regional orientation** between the two different types of HEIs, according to the five analysed indicators, it can be concluded that the assumption is confirmed. The assumption is confirmed in 4 out of 5 analysed indicators. The only indicator that indicates that there is a difference between university constituents and polytechnics is indicator 3. It describes the involvement of the HEIs in development of regional development strategies. It means that newer and smaller HEIs are easier to include in the process of drafting regional development strategies. The test was performed at a significance level of 5%. Since the statistical analysis of most of the indicators (4 of 5) proved that there were no significant differences, it can be concluded that the analysed differences between polytechnics and universities were not statistically significant.

The difference in **regional engagement** of Croatian HEIs is almost not visible. The most objective indicator used, is the share of projects implemented in cooperation with regional economic entities in the total number of such realized projects. At university level it amounted to 78.3%, while at the level of polytechnics it amounted to 83.3%. It is evident that according to the analysed indicator, there is no difference. Further in the text, the statistical testing of the difference between the universities and polytechnics, according to the average number of projects in collaboration with regional industry, was presented. For testing, the Wilcoxon-Mann Whiney U-test (or WMW test) was used. The results are shown in Table 15.

Table 15 The results of Wilcoxon Mann-Whiney U-test (WMW test)

Statistic (S)	119.5
Normal Approximation	
Z	0.1161
One-Sided Pr>Z	0.4538
Two-Sided Pr>|Z|	0.9076
t Approximation	
One-Sided Pr>Z	0.4543
Two-Sided Pr>|Z|	0.9086
Exact test	
One-Sided Pr>S	0.4627
Two-Sided Pr>|S-Mean|	0.9223

Source: Results of the empirical research

Since the p-value is 0.9223, which means greater than 0.05 (>0.05), it can be concluded that the difference in the average number of projects in cooperation with the regional industry between universities and polytechnics are not statistically significant.

Other researched segments did not show relevant differences between universities and polytechnics. In fact, they assess approximately equally the contributions of their institutions to selected components of regional development. The average scores can be seen in Table 16.

Table 16 The average scores of selected regional indicators from the scientist's point of view

Indicator	University constituents (Faculties)	Polytechnics
The average score for contribution of the HEIs to selected components of regional development from the perspective of scientists (based on 6 parameters)	3.05	3.0
Total of survey respondents	**21**	**9**

Source: Results of the empirical research

So, it can be concluded, that according to testing the indicators of HEIs' regional engagement, the difference between universities and polytechnics is also not statistically significant.

4. Conclusion and Recommendations

The main objective of this paper was to present the results of the empirical research on regional orientation and engagement of Croatian higher education institutions (HEIs). For that reason, the research task was to verify the hypothesis which argues that between different HEIs there is no visible difference in their regional orientation and engagement. As shown in the paper, the starting hypothesis is mainly proven. The presented results and statistical tests suggest that according to the measured indicators, there are no statistically significant differences between universities and polytechnics. The next contribution of this paper lies in the suggested measures of the regional engagement of the HEIs. Research results are the starting evaluation of the Croatian "binary" system of higher education, in which differences between the different HEIs are not clearly visible. The author hereby does not advocate the introduction of a pure binary system of tertiary education. However, if the Republic of Croatia decided to introduce it, then it is necessary to ensure quality introduction and set clearer differentiation criterions, to which the results of the research presented in this paper also contribute. The basic limitation of the study is reflected in the incomplete sample. The Republic of Croatia, at the time of research, had 96 public HEIs, with 70 HEIs relevant to this research. The sample in this paper included 30 of them, since only those institutions were willing to participate in this research. The next limitation is the potential subjectivity of the respondents in some indicators. The survey was conducted by means of a questionnaire, although it would have been better and maybe more accurate to acquire information in an interview. The paper argues that, if the interest of the Republic of Croatia is to constitute a binary system of higher education, it is necessary to differentiate the roles that different institutions and their study programs have. Croatia currently has a mixed system of higher education, which is reflected in the fact that the organization and performance of professional studies has not been fully delineated, since professional study programs are offered at polytechnics and universities. Furthermore, in addition to dividing studies into university and professional studies, it is necessary to set different tasks before the HEIs. Those institutions that offer professional studies, which should suit the needs of the region in which they are located, should be required to actively respond to the regional needs of society and the economy. Institutions that offer more research-based or university studies will continue to retain their national and international orientation. Only with such division and distinctive criteria can a binary system be properly constituted. Until then only ideological attempts to establish a binary system will prevail in the Republic of Croatia, while in reality the already present mixed system of tertiary education will continue to prevail.

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Endnotes

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2 The Scientific Activity and Higher Education Act (Official Gazette 123/03, 198/03, 105/04, 174/04, 46/07, 63/11, 94/13, 139/13, 101/14, 60/15)

3 If You would like to know more about it, please have a glance at the following papers:

For Germany: Jaeger, A., Kopper, J. (2014), "Third mission potential in higher education: measuring the regional focus of different types of HEIs", Review of Regional Research, Vol. 34, No. 2, pp. 95-118.

For Finland: Ministry of Education (2005), „OECD Thematic Review of Tertiary Education: Country Background Report for Finland", Helsinki: Ministry of Education, Available at: http://www.oecd.org/edu/skills-beyond-school/36039008.pdf (Accessed on: April 21, 2015)

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Mirjana Jeleč Raguž

REGIONALNA ORIJENTIRANOST VISOKOOBRAZOVNIH INSTITUCIJA U REPUBLICI HRVATSKOJ

Sažetak

Cilj je rada prikazati rezultate provedenog empirijskoga istraživanja o regionalnoj orijentiranosti i angažiranosti hrvatskih visokih učilišta. Drugi cilj je istražiti postoji li razlika između hrvatskih sveučilišta i veleučilišta prilikom realizacije njihove treće misije, odnosno regionalne orijentiranosti i angažiranosti. Doprinos regionalnom ekonomskom, socijalnom i kulturnom razvoju regije, novija je misija koja se, pored obrazovanja i istraživanja, nameće pred institucije visokog obrazovanja. Republika Hrvatska je osnivanjem javnih veleučilišta diljem zemlje prihvatila novu misiju visokih učilišta te ih osnivala s ciljem doprinosa regionalnom razvoju. Takve institucije trebale bi, u usporedbi sa sveučilištima, biti više regionalno orijentirane, odnosno nuditi studijske programe i provoditi istraživanja potrebna gospodarstvu u regiji. Budući da zakonski nisu do kraja jasno istaknute razlike između sveučilišnih te stručnih studija, navedena bi orijentiranost trebala biti bitna komponenta razlikovanja. Za potrebe istraživanja definiran je uzorak koji se sastoji od hrvatskih javnih veleučilišta i sastavnica sveučilišta, na kojima je provedeno anketno ispitivanje. Rezultati istraživanja i statistički testovi ukazuju na to da ne postoji statistički značajna razlika u regionalnoj orijentiranosti i angažiranosti između hrvatskih sveučilišta i veleučilišta. Daljnjim istraživanjima u području ove teme nastojat će se doprinijeti osvješćivanju visokih učilišta i nositelja ekonomske politike u području diferenciranja predmetnih institucija te poticanju razvoja regionalne misije hrvatskih veleučilišta, posebice prilikom provedbe vanjskog vrednovanja.

Ključne riječi: sveučilišta, veleučilišta, razlike, regionalna orijentiranost, Republika Hrvatska