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THE SCIENTIFIC PRODUCTIVITY OF CROATIAN ECONOMICS AND BUSINESS EDUCATIONAL INSTITUTIONS: RELATION OF SIZE AND PRODUCTIVITY

ABSTRACT

This study assesses the scientific productivity of Croatian economics and business educational institutions focusing on the relation of productivity to their size. A bibliometric analysis was applied to 13 educational institutions whose publications were listed in the Croatian Scientific Bibliography (CROSBI) in the period from 1991 to November 2012. More than 4400 scientific conference papers with international peer-review, 3500 scientific papers in journals, 1500 book chapters, 462 authored books, 191 edited books and 130 textbooks and coursepacks were found. The bibliometric analysis of publication data showed an increasing trend in scientific paper publishing in each consecutive period observed within this research. An increase in publications was evidenced by an increased number of book chapters, starting with 13 publications in the period from 1991 to 1996, over 275 publications in the period from 1996 to 2002, ending with 770 publications in the period from 2007 to November 2012. A similar trend is observed in other types of publications as well. Furthermore, the number of academic staff at economics and business educational institutions in Croatia was taken into account within the study in order to reach findings about the relation of an institution's size and its productivity.

Keywords: Scientific productivity, economics and business, Croatia, post-transition, trend

1. Introduction

Scientists from Eastern European (EE) countries that publish their research in the area of economics and business face a number of barriers towards publication. First, due to the ideological reasons, economics and business research in capitalist and communist/socialist societies used to be very different until the early 1990s when perestroika caused the breakup of the former Soviet Union, uprisings in EE countries, and termination of the Cold War (Brown, 2007; Uzun, 2002). Second, researchers from EE countries came across many obstacles in their attempt to catch up with their colleagues from developed countries, owing to the diverse institutional milieu of scientific research (Olenik, 2012), especially due to the fact that authoritarian regimes do not represent enticing surroundings for scientific production (Josephson, 1996). Third, due to the fact that English has become the main language of science, linguistic reasons are also important for authors from non-English speaking countries, especially in the social sciences (Gantman, 2009; 2011; 2015; Tychinin et al., 2005). Fourth, future professionals are rarely instructed on scientific writing and manuscript preparation, and usually learn the craft of scientific writing only through the painstaking process of trial and error (Keys, 1999; Pejić Bach, 2012; Andonie et al., 2010).

In Croatia there are a number of public and private institutions that offer educational programmes in economics and business. Besides teaching, their role is also to participate in research in the field of economics and business and to publish results of their research in scientific publications. The analysis of previous publications indicated that in Croatia there is no research of publication patterns of Croatian economics and business educational institutions. This fact and the lack of publication pattern analysis were our main incentives for research on publication patterns of Croatian economics and business educational institutions.

The goal of the paper is to examine publication patterns and trends in economics and business science publications in Croatia by applying bibliometric analysis to peer-reviewed publications published by Croatian public and private educational institutions in the period from 1991 to 1 November 2012. The scientific contributions of this re-

search are as follows: (i) discussion of the publication patterns of Croatian economics and business educational institutions in a period longer than 20 years - from 1991 until November 2012, according to the type of publications, and (ii) discussion of the relationship between the number of the academic staff employed at the institution and publication patterns in order to shed some light on the institution's productivity.

The paper is organized as follows. First, after the introduction, the methodology of the research is presented, that consists of the selection of the institution and the selection of publications, as well as the measurement of productivity. In the third chapter, the results are presented that outline the patterns in the total number of publications per institution. In the fourth chapter, the relationship between the number of academic staff and the number of publications is investigated using the correlation analysis. The final chapter provides the conclusion of our research.

2. Methodology

2.1 Selection of Croatian economics and business educational institutions

The source for finding a complete list of institutions that offer educational programmes in economics and business was the website of the Croatian Agency for Science and Higher Education (ASHE). ASHE records institutions that have the license issued by the Ministry of Science, Education and Sports of the Republic of Croatia to offer educational programmes. The license is the final administrative decision issued to higher education institutions confirming that the institution is eligible to start educational activities. The ASHE website was analysed in October 2012, and the results revealed that 41 different educational institutions (universities, university departments, faculties, polytechnics, and colleges) offer 164 educational programmes in the field of economics and business. However, in our work we focused only on the institutions in the Croatian Scientific Bibliography (CROSBI). Out of a total of 41 educational institutions, there are 13 educational institutions whose publications are listed in CROSBI: the Faculty of Organization and Informatics in Varaždin (FOI), the Faculty of Tourism

and Hospitality Management in Opatija (FMTUO), the Faculty of Economics in Osijek (EFOS), the Faculty of Economics in Rijeka (EFRI), the Faculty of Economics in Split (EFST), the Faculty of Economics and Business in Zagreb (EFZG), the Karlovac University of Applied Sciences (VUK), the Polytechnic of Požega (VUP), the Polytechnic of Rijeka (VUR), the University of Applied Sciences (VERN), the College of Business & Management 'Baltazar Adam Krčelić' (VŠPUBAK), and the Zagreb School of Economics and Management (ZŠEM).

2.2 Publications

Within this research the Croatian Scientific Bibliography (CROSBI), which records scientific papers published in the period from 1991 to November 2012 was used as the publications data source. The CROSBI bibliography is an important source of the Croatian scientific output, aimed at increasing public awareness of Croatian research results. Authors that are registered in Croatia as scientists are eligible to record their publications in CROSBI by using their electronic identity in the AAI@EduHr system, which is a virtual identity in the CARNet network received by individual users (students, teachers, professors and other staff members) from CARNet member institutions.

Possible approaches to detecting publications of institutions that offer educational programmes in economics and business include publication tracking: (1) by authors employed at these institutions, or (2) by institutions. Since lists of the staff of the institutions are not publicly available, we had to track publications by institutions. Not all of the publications published by Croatian researchers are registered in CROSBI since the authors themselves enter the data for their publications and this represents the major limitation of this study. It is also important to mention that, since we tracked publications by institutions, some of the publications are recorded two or more times because their authors are from two or more institutions.

3. Results

Table 1 shows the number of authored books, edited books, book chapters and textbooks and

coursepacks in the period from 1991 to November 2012. We can note that there was an increase in the number of published publications in each consecutive period observed within this research.

The number of published book chapters is the largest by far and it amounts to 1500 book chapters in the period from 1991 to November 2012. When it comes to institutions, the academic staff of the Faculty of Economics and Business in Zagreb published the greatest number of book chapters, 531, followed by the Faculty of Economics in Osijek whose academic staff published 255 book chapters, the Faculty of Economics in Rijeka with 243 book chapters and finally, the Faculty of Economics in Split with 166 published book chapters.

Furthermore, there are also many published author's books, i.e. 462 books in the period from 1991 to November 2012. Again, the academic staff of the Faculty of Economics and Business in Zagreb published 140 authored books, which is the greatest number among all the institutions. The Faculty of Economics in Osijek contributed with 91 authored books and is followed by the Faculty of Economics in Rijeka with 78 authored books.

Similarly, there are 430 published textbooks and coursepacks dating from the period from 1991 to November 2012. There are 97 textbooks and coursepacks published by the academic staff of the Faculty of Economics and Business in Zagreb, 90 textbooks and coursepacks by the staff of the Faculty of Economics in Osijek and 65 textbook and coursepacks by the academic staff of the Faculty of Economics in Split.

Finally, edited books, with 191 publications are the least represented in the total number of published works. The academic staff of the Faculty of Economics in Rijeka published 62 edited books, followed by the Faculty of Economics in Osijek with 49 edited books and the Faculty of Economics and Business in Zagreb with 40 published edited books. Other polytechnics and private institutions also gave their contribution to the total number of published works, but compared to public institutions in the four main cities in Croatia, their contribution is not that significant.

Table 1 *Authored books, edited books, book chapters and textbooks and coursepacks (1991 – November 1, 2012)*

Publication type	Period	FOI	FMTUO	EFOS	EFRI	EFST	EFZG	VUK	VUP	VUR	VERN	VŠPUBAK	VGUK	ZŠEM	Total
Authored books	1991-1996	8	4	5	3		4						1		25
	1996-2002	3	8	24	12	4	26			1			2		80
	2002-2007	9	12	30	28	18	65	1	1	1		1	2	3	171
	2007-	8	14	32	35	25	45	3	4	3	1	7	4	5	186
	Total	28	38	91	78	47	140	4	5	5	1	8	9	8	462
Edited books	1991-1996														0
	1996-2002		5	7	18	5	4								39
	2002-2007	6		19	23		11								59
	2007- November 2012	10	2	23	21	6	25					1	1	4	93
	Total	16	7	49	62	11	40	0	0	0	0	1	1	4	191
Book chapters	1991-1996	2	2	1	1	2	5								13
	1996-2002	8	36	45	43	51	89						2	1	275
	2002-2007	23	34	82	75	45	153	3	3	3	1		1	19	442
	2007-	69	36	127	124	68	284	1	4	15	1	3	3	35	770
	Total	102	108	255	243	166	531	4	7	18	2	3	6	55	1500
Textbooks and coursepacks	1991-1996	1		4		4							2		11
	1996-2002	10	4	23	8	13	30			1			2		91
	2002-2007	18	7	25	21	25	32	3		8	1	5	7	1	153
	2007-	13	9	38	20	23	35	8	5	12	3	2	4	3	175
	Total	42	20	90	49	65	97	11	5	21	4	7	15	4	430

Source: *Croatian Scientific Bibliography*, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Table 2 presents the number of papers in scientific journals recorded in the Croatian Scientific Bibliography in the period from 1991 to November 2012. In this category each segment recorded a growth in each consecutive period observed within the study.

The greatest number of publications was published in the segment of scientific papers in other journals where 3353 scientific papers were recorded. The academic staff of the Faculty of Economics and Business in Zagreb published 1142 scientific papers in other journals, followed by 632 scientific papers by the academic staff of the Faculty of Economics in Rijeka and more than 340 scientific journals by the academic staff of the Faculty of Economics in Osijek and the Faculty of Economics in Split.

The second segment with the highest number of published papers is the segment of non-scientific papers in other journals where the total number of 1347 non-scientific papers is recorded. The greatest contribution in this segment is also by the Faculty of Economics and Business in Zagreb with 431 published non-scientific papers, followed by the Faculty of Economics in Rijeka with 247 and the Faculty of Economics in Osijek with 179 published non-scientific papers.

Furthermore, journal articles and review articles in CC journals are in the third place in this category based on the number of published articles. Again, the academic staff of the Faculty of Economics and Business in Zagreb published the highest number of articles, 86 journal articles and review articles in CC journals, the Zagreb School of Economics and Management is next with 29 articles, followed by the Faculty of Economics in Rijeka and the Faculty of Economics in Osijek with more than 20 published journal articles and review articles in CC journals.

Furthermore, the academic staff of the Faculty of Economics and Business in Zagreb published 14 out of the total number of 39 conference reports (abstracts) in other journals. Data in Table 2 lead to the conclusion that in the category of papers in scientific journals recorded in the Croatian Scientific Bibliography, the academic staff of the Faculty of Economics and Business in Zagreb generated significantly the highest number of published papers, followed by the economics and business educational institutions from Osijek, Rijeka and Split.

Table 2 Papers in scientific journals recorded in the Croatian Scientific Bibliography (1991 – November 1, 2012)

Publication type	Period	FOI	FMTUO	EFOS	EFRI	EFST	EFZG	VUK	VUP	VUR	VERN	VŠPUBAK	VGUK	ZSEM	Total
Journal articles and review articles in CC journals	1991-1996			1		2	1								4
	1996-2002			5	1	3	9								18
	2002-2007	5	2	6	14	2	17						1	4	51
	2007-November 2012	17	2	12	10	13	59	1		5			5	25	149
	Total	22	4	24	25	20	86	1	0	5	0	0	6	29	222
Other papers in CC journals	1991-1996				4										4
	1996-2002			1	4		1								6
	2002-2007					2									2
	2007-November 2012						1						1	1	3
	Total	0	0	1	8	2	2	0	0	0	0	0	1	1	15
Scientific papers in other journals	1991-1996	32	22	33	16	11	19						8	2	143
	1996-2002	82	58	82	167	65	180		1				25	3	663
	2002-2007	86	110	98	220	61	357	7	3	11		2	27	9	991
	2007-November 2012	169	94	132	229	206	586	21	26	9		11	41	32	1556
	Total	369	284	345	632	343	1142	28	30	20	0	13	101	46	3353
Non-scientific papers in other journals	1991-1996	4	3	17	2		10						5		41
	1996-2002	23	35	56	39	24	95		1			2	11	1	287
	2002-2007	27	30	64	75	42	132	9	23	1		4	16	7	430
	2007-November 2012	18	20	42	131	56	194	22	42	8		1	18	37	589
	Total	72	88	179	247	122	431	31	66	9	0	7	50	45	1347
Conference reports (abstracts) in other journals	1991-1996	1													1
	1996-2002												1		1
	2002-2007		1	2	2	2	5						2		14
	2007-November 2012		2	2	3	3	9		1				2	1	23
	Total	1	3	4	5	5	14	0	1	0	0	0	5	1	39
Papers in the publishing process	1991-1996														0
	1996-2002					1									1
	2002-2007	2	4	2		4	11								23
	2007-November 2012	10	4	7	19	15	18	2	3				6	5	89
	Total	12	8	9	19	20	29	2	3	0	0	0	6	5	113

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Table 3 shows scientific conference papers recorded in the Croatian Scientific Bibliography in the period from 1991 to November 2012. As well as categories presented in Table 1 and Table 2, in this category a significant growth of published scientific conference papers was also recorded in the period from 1991 to November 2012.

The highest number is in the segment of scientific conference papers with international peer-review and it amounts to 4470 scientific conference papers. The academic staff of the Faculty of Economics and Business in Zagreb published 1154 scientific papers with international peer-review. The Faculty of Economics in Rijeka with 758 papers is in the second place in this segment. It is followed by the Faculty of Economics in Osijek with 628 and the Faculty of

Economics in Split with 427 scientific conference papers with international peer-review.

When it comes to other refereed conference papers, there were 1160 refereed conference papers published until November 2012. The highest contribution in this segment was made by the academic staff of the Faculty of Economics and Business in Zagreb with 281 papers, 228 papers by the academic staff of the Faculty of Economics in Osijek and 149 refereed conference papers by the academic staff of the Faculty of Economics in Rijeka.

Abstracts in books of abstracts with 875 publications are in the third place in this category. The academic staff of the Faculty of Economics and Business in Zagreb published 256 abstracts, followed by the Faculty

of Organization and Informatics in Varaždin with 108 published abstracts and 99 abstracts in books of abstracts by the academic staff of the Faculty of Tourism and Hospitality Management in Opatija.

There are also many non-refereed conference papers recorded in the Croatian Scientific Bibliography, i.e. 282 non-refereed conference papers. Institutions whose academic staff published the highest number of publications in this segment are the Faculty of Organization and Informatics in Varaždin and the

Faculty of Tourism and Hospitality Management in Opatija with more than 50 non-refereed conference papers followed by the Faculty of Economics and Business in Zagreb with 49 non-refereed conference papers. Plenary / Keynote talks and published invited lectures are less represented, but members of the academic staff of the Faculty of Economics and Business in Zagreb again lead in the number of plenary / keynote talks as well as published invited lectures.

Table 3 Scientific conferences recorded in the Croatian Scientific Bibliography (1991 – November 1, 2012)

Publication type	Period	FOI	FMTUO	EFOS	EFRI	EFST	EFZG	VUK	VUP	VUR	VERN	VŠPUBAK	VGUK	ZŠEM	Total
Plenary / Keynote talks	1991-1996						2						2		4
	1996-2002		3		1		10						1	3	18
	2002-2007	11	13	13	14	1	18				1	2	2		75
	2007-November 2012	4	5	11	11	2	19	2		1			1	2	58
	Total	15	21	24	26	3	49	2	0	1	1		4	9	0
Published invited lectures	1991-1996	1		1			1								3
	1996-2002		1	4	7	14	12						1		39
	2002-2007	2	6	12	7	2	39						1		69
	2007-	5	7	7	28	7	48	1		1				2	106
	Total	8	14	24	42	23	100	1	0	1	0	0	4	0	217
Scientific conference papers with international peer-review	1991-1996	6	10	11	8	3	15	1							54
	1996-2002	79	130	157	197	138	159	11		2			1		874
	2002-2007	236	106	221	303	157	354	26	16	24	4	9	3	8	1467
	2007-	384	142	239	250	129	626	67	93	76	9	10	27	23	2075
	Total	705	388	628	758	427	1154	105	109	102	13	19	31	31	4470
Other refereed conference papers	1991-1996	4	3	2	1		2	1							13
	1996-2002	38	16	62	46	13	64	3					5		247
	2002-2007	59	29	94	58	28	104	7	18	12			12	2	423
	2007-	63	41	70	44	27	111	32	49	9	3	1	15	12	477
	Total	164	89	228	149	68	281	43	67	21	3	1	32	14	1160
Non-refereed conference papers	1991-1996	2		3			1								6
	1996-2002	20	24	19	10	7	15						1		96
	2002-2007	17	18	18	12	2	14	1		12			1		95
	2007-	18	13	2	10	11	19		1	9	1		1		85
	Total	57	55	42	32	20	49	1	1	21	1	0	3	0	282
Abstracts in books of abstracts	1991-1996	1	18	4		2									25
	1996-2002	11	34	44	28	22	50	1		1	1		15		207
	2002-2007	35	22	25	43	29	92	6	2	5	2		7	3	271
	2007-	61	25	14	22	25	114	26	14	17	1	3	45	5	372
	Total	108	99	87	93	78	256	33	16	23	4	3	67	8	875

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

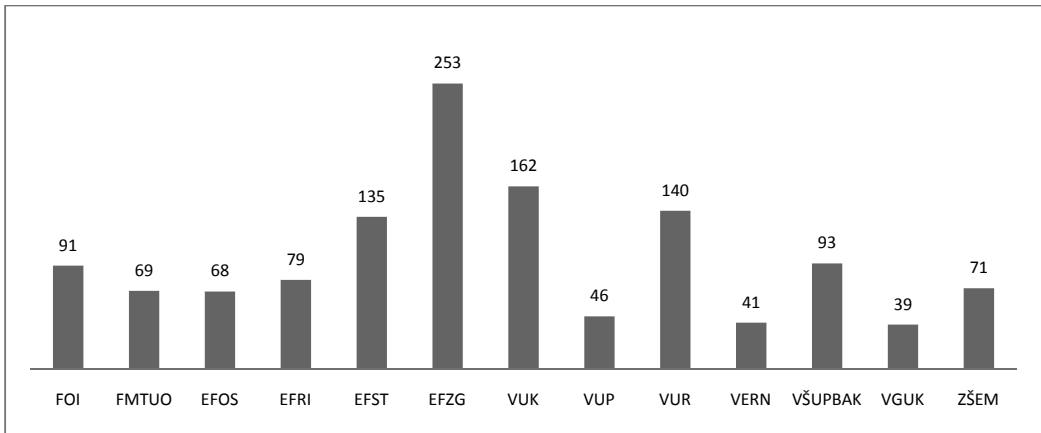
4. Relation of the number of publications and the number of academic staff

The second goal of this paper is to investigate the scientific productivity of Croatian economics and business institutions. In order to assess this goal, we have to take into account the number of academic staff at economics and business educational institutions in Croatia.

The average number of academic staff at the investigated institutions is calculated from the period of 2009 to 2012.

Figure 1 presents the number of the academic staff, working on an employment contract and contractual agreement basis at the aforementioned institutions in the period from 2009 to 2012. The Faculty of Economics and Business in Zagreb has the highest number of academic staff, i.e. 253 academic staff members. It is followed by the Karlovac University of Applied Sciences with 162 staff members, the Polytechnic in Rijeka with 140 academic staff members and the Faculty of Economics in Split with 135 academic staff members. Other institutions observed within this research have less than one hundred academic staff members.

Figure 1 Average number of the academic staff working on an employment contract and contractual agreement basis (average 2009-2012)



Source: Teaching staff at institutions of higher education (academic years 2009/2010, 2010/2011, 2011/2012); Croatian Bureau of Statistics; Authors' work

4.1 Average number of publications per academic staff member

The average number of publications per academic staff member is calculated. Table 4 presents the average number of authored books, edited books, book chapters and textbooks and coursepacks per academic staff member (2009-2012).

Generally speaking, the institutions of the biggest Croatian cities on average have the greatest number of books and publications per academic staff member. When it comes to authored books, the most notable institution is the Faculty of Economics in Rijeka with 0.24 books per academic staff member. The best results are seen in book chapters, where the Faculty of Economics in Osijek takes the first

place with 1.08 book chapters per academic staff member, followed by the Faculty of Economics and Business in Zagreb with 0.73, the Faculty of Economics in Rijeka with 0.66 and finally, the Faculty of Economics in Split with 0.36 book chapters per staff member. Given the number of staff members, the results for institutions in Zagreb and Split were expected, since these institutions employ the largest number of staff members. On the other hand, special importance must be given to the institutions in Osijek and Rijeka, since the number of academic staff members at these institutions is significantly smaller, and the results generated by them are the best in this field (1.08 and 0.66 book chapters per academic staff member).

Table 4 Average number of authored books, edited books, book chapters and textbooks and course-packs per academic staff member (2009-2012)

Institution	Total number of books (2009-2012)				Average number of books / academic staff member (2009-2012)			
	Authored books	Edited books	Book chapters	Textbooks and course-packs	Authored books	Edited books	Book chapters	Textbooks and course-packs
FOI	5	7	5	6	0.05	0.08	0.05	0.07
FMTUO	5	2	18	7	0.07	0.03	0.25	0.10
EFOS	13	11	74	23	0.19	0.16	1.08	0.34
EFRI	19	1	52	1	0.24	0.01	0.66	0.01
EFST	14	5	49	14	0.10	0.04	0.36	0.10
EFZG	29	15	184	21	0.11	0.06	0.73	0.08
VUK	2	-	-	4	0.01	-	-	0.02
VUP	3	-	2	5	0.06	-	0.04	0.11
VUR	2	-	7	6	0.01	-	0.05	0.04
VERN	1	-	3	1	0.02	-	0.07	0.02
VŠUPBAK	5	-	3	1	0.05	-	0.03	0.01
VGUK	2	1	2	1	0.05	0.03	0.05	0.03
ZŠEM	3	3	17	1	0.04	0.04	0.24	0.01

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Table 5 presents the average number of papers in scientific journals, and institutions from Zagreb, Osijek, Rijeka and Split again have the best results. Furthermore, it shows that the best results are in the field of scientific papers in other journals, where the Faculty of Economics in Rijeka has 1.56 scientific papers in other journals per academic staff member. It is shown that the Faculty of Economics and Business in Zagreb has the greatest number of publications when it comes to the number of papers in scientific journals recorded in the Croatian Scientific Bibliography, with an average of 1.18 scientific papers in other journals per academic staff member and 0.47 non-scientific papers in other journals per academic staff member.

The Faculty of Economics in Rijeka, the Faculty of Economics in Split and the Faculty of Economics in Osijek have a significant number of publications. All institutions have the greatest average of publications per academic staff member in the field of

scientific papers in other journals, followed by non-scientific papers in other journals.

The lowest average number of publications is related to papers in the publishing process. Besides public institutions, there are a few private economics and business educational institutions, among which we can single out the Zagreb School of Economics and Management. It has 71 academic staff members and in this group of publications the majority are related to non-scientific papers in other journals, with 0.48 non-scientific papers per academic staff member.

According to the data above, we can conclude that the highest number of publications per academic staff member is generated at public institutions, primarily at faculties. Consequently, that leads us to the conclusion that the greatest commitment to publishing is shown by academic employees employed at public faculties of economics and business in large cities.

Table 5 Average number of papers in scientific journals recorded in the Croatian Scientific Bibliography per academic staff member (2009-2012)

Institution	Total number (2009-2012)				Average number / academic staff member (2009-2012)			
	Journal articles and review articles in CC journals	Scientific papers in other journals	Non-scientific papers in other journals	Papers in the publishing process	Journal articles and review articles in CC journals	Scientific papers in other journals	Non-scientific papers in other journals	Papers in the publishing process
FOI	11	1	6	2	0.12	0.01	0.07	0.02
FMTUO		53	9	2		0.77	0.13	0.03
EFOS	9	83	26	3	0.13	1.21	0.38	0.04
EFRI	4	123	5	19	0.05	1.56	0.06	0.24
EFST	1	162	25	1	0.01	1.20	0.19	0.01
EFZG	36	299	119	1	0.14	1.18	0.47	0.00
VUK	1		11	1	0.01		0.07	0.01
VUP			17	3			0.37	0.06
VUR	3	15	6		0.02	0.11	0.04	
VERN		1	2			0.02	0.05	
VŠUPBAK		7				0.08		
VGUK	4	27	1	5	0.10	0.69	0.03	0.13
ZSEM	14	23	31	3	0.20	0.32	0.48	0.04

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Table 6 presents the average number of scientific conferences recorded in the Croatian Scientific Bibliography per academic staff member in the period from 2009 to November 2012.

The greatest contribution is recorded in the field of scientific conference papers with international peer-review where academic staff members of the Faculty of Economics in Osijek published on average 1.80 papers, followed by employees of the Faculty of Economics in Rijeka with 1.59 papers and academic staff of the Faculty of Economics in Zagreb with an average of 1.37 published scientific conference papers with international peer-review. Furthermore, staff at the Faculty of Economics in Rijeka gave their greatest contribution in the field of published plenary / keynote talks, with 0.8 talks on average, and

published invited lectures with an average of 0.22 published lectures per academic staff.

In the field of other refereed conference papers, the Polytechnic of Požega has an average of 0.54 refereed papers per academic staff member, while staff of the Faculty of Economics in Osijek published 35 refereed conference papers, which is an average of 0.51 papers per academic staff member.

Finally, in the field of abstracts in books of abstracts, the staff of the Faculty of Tourism and Hospitality Management in Opatija published 17 abstracts which is an average of 0.25 abstracts per academic staff member, followed by the staff of the Faculty of Economics in Zagreb who published 46 abstracts, which is an average of 0.18 published abstracts in books of abstracts per academic staff member.

Table 6 Average number of scientific conference papers recorded in the Croatian Scientific Bibliography per academic staff member (2009-2012)

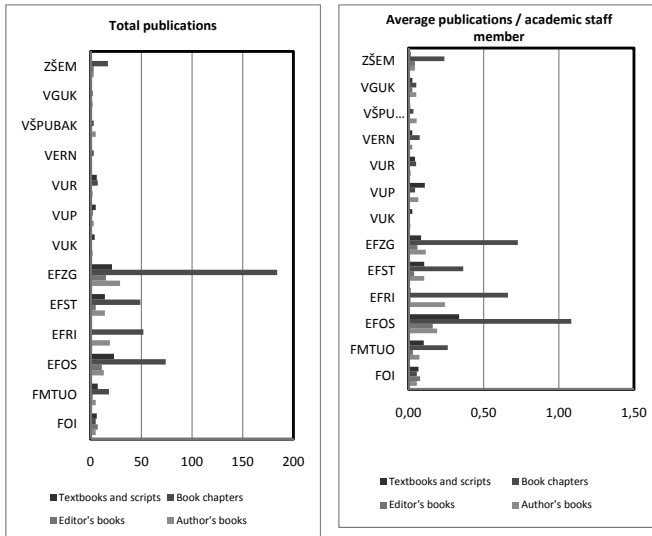
Institution	Total number (2009-2012)						Average number / academic staff member (2009-2012)					
	Plenary / Keynote talks	Published invited lectures	Scientific conference papers with international peer-review	Other refereed conference papers	Non-refereed conference papers	Abstracts in books of abstracts	Plenary / Keynote talks	Published invited lectures	Scientific conference papers with international peer-review	Other refereed conference papers	Non-refereed conference papers	Abstracts in books of abstracts
FOI	2	3	2	3	5	21	0.02	0.03	0.02	0.03	0.05	0.23
FMTUO	2	3	88	19	5	17	0.03	0.04	1.28	0.28	0.07	0.25
EFOS	1	3	123	35	1	6	0.01	0.04	1.80	0.51	0.01	0.09
EFRI	6	17	125	2	2	1	0.08	0.22	1.59	0.03	0.03	0.01
EFST		5	84	14	7	9		0.04	0.62	0.10	0.05	0.07
EFZG	1	2	346	6	9	46	0.00	0.01	1.37	0.02	0.04	0.18
VUK	2		31	14		13	0.01		0.19	0.09		0.08
VUP			5	25	1	6			0.11	0.54	0.02	0.13
VUR	1	1	43	3	2	9	0.01	0.01	0.31	0.02	0.10	0.06
VERN			7						0.17			
VŠUPBAK			6	1		3			0.06	0.01		0.03
VGUK	1	1	15	6		29	0.03	0.03	0.38	0.15		0.74
ZŠEM			13	4		1			0.18	0.06		0.01

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Figure 2 presents the total number of published authored books, edited books, book chapters and textbooks and coursepacks (2009-2012), as well as the average number of these publications per staff member. The figure indicates that the book chapters are dominant at almost all institutions, especially at institutions in Zagreb, Split, Rijeka and Osijek. The highest average number of book chapters per academic staff member, i.e. 1.08 book chapters per staff member, is recorded at the Faculty of Economics

in Osijek. Authored books are in the second place, with the highest average number, i.e. 0.24 authored book per academic staff member, recorded at the Faculty of Economics in Rijeka. Edited books and textbooks and coursepacks are less frequent in general, but the greatest number of these types of publications is published by the academic staff employed at the Faculty of Economics in Osijek (0.16 edited books and 0.34 textbooks and coursepacks per academic staff member).

Figure 2 Total number of publications and average number of publications per academic staff member - authored books, edited books, book chapters and textbooks and coursepacks (2009-2012)

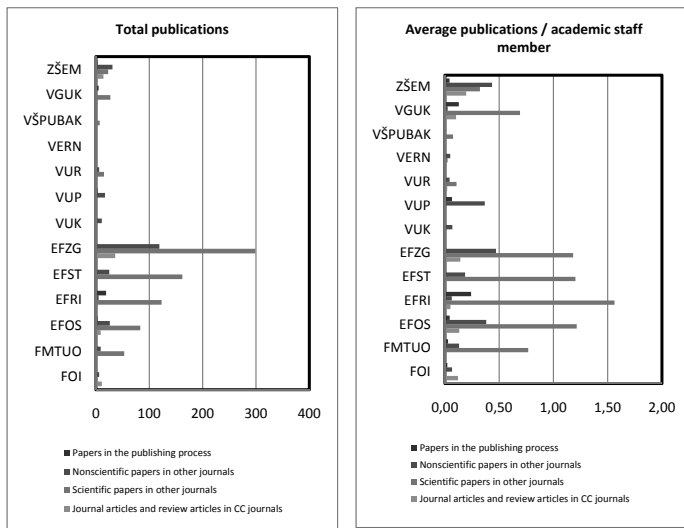


Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Figure 3 presents the total number of published papers in scientific journals (2009-2012), as well as the average number of these publications per staff member.

The figure indicates that the scientific papers in other journals are dominant at almost all institutions, especially at institutions in Zagreb, Split, Rijeka and Osijek.

Figure 3 Total number and average number of publications per academic staff member in the total number of papers in scientific journals recorded in the Croatian Scientific Bibliography (2009-2012)



Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

4.2 Correlation analysis of the number of publications per academic staff member

Table 7 presents the correlation of the number of academic staff with the total number of authored books. The correlations indicate a strong and positive relationship. The correlation for authored books is 0.614, for edited books 0.537, for book chapters 0.687, and for textbooks and coursepacks 0.514. The correlation of the number of academic staff and au-

thored books is statistically significant at 5%, while the correlation with the number of staff and edited books, book chapters and textbooks and coursepacks is statistically significant at 10%. However, the correlations between the average number of books per academic staff member are very low, and are not statistically significant. This indicates that the larger institutions are not more productive than the smaller institutions, measured in number of staff.

Table 7 Correlation of the number of academic staff with the total number of authored books, edited books, book chapters and textbooks and coursepacks (2009-2012)

Academic staff, working on an employment contract and contractual agreement basis (average 2009-2012)		Correlation with the number of the academic staff (-1 < r < 1)	P-value
Total number of books (2009-2012)	Authored books	0.614**	0.026
	Edited books	0.537*	0.058
	Book chapters	0.687*	0.090
	Textbooks and coursepacks	0.514*	0.072

Note: ** statistically significant at 5%, * statistically significant at 10%

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

Table 8 presents the correlation of the number of academic staff with the total number of papers in scientific journals. The correlations indicate a strong and positive relationship. The correlation for journal articles and review articles in CC journals is 0.648, which is statistically significant at 4%. For the scientific papers in other journals it is 0.681, which

is statistically significant at 5%, and for the non-scientific papers in other journals it is 0.747, statistically significant at 1%. On the other hand, papers in the publishing process are negatively correlated with the number of academic staff, which is not statistically significant.

Table 8 Correlation of the number of academic staff with the total number of papers in scientific journals recorded in the Croatian Scientific Bibliography (2009-2012)

Academic staff, working on an employment contract and contractual agreement basis (average 2009-2012)		Correlation with the number of the academic staff (-1 < r < 1)	P-value
Total number (2009-2012)	Journal articles and review articles in CC journals	0.648**	0.017
	Scientific papers in other journals	0.681**	0.010
	Non-scientific papers in other journals	0.747***	0.003
	Papers in the publishing process	-0.233	0.444

Note: ** statistically significant at 5%, *** statistically significant at 1%

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

The interconnection between the number of academic staff and scientific conference papers with international peer-review is strong and positive (0.716) and it is statistically significant at 1%. Also, the correlation between non-refereed conference papers and the number of academic staff, as well as

correlations between abstracts in books of abstracts and the number of the academic staff are strong (0.639 and 0.586 respectively) and statistically significant at 1%. However, the correlations are not statistically significant for plenary / keynote talks and published invited lectures.

Table 9 Correlation with the number of academic staff in the total number of scientific conferences recorded in the Croatian Scientific Bibliography (2009-2012)

Academic staff, working on an employment contract and contractual agreement basis (average 2009-2012)		Correlation with the number of the academic staff (-1 < r < 1)	P-value
Total number (2009-2012)	Plenary / Keynote talks	0.027	0.930
	Published invited lectures	-0.025	0.935
	Scientific conference papers with international peer-review	0.716**	0.006
	Other refereed conference papers	-0.140	0.649
	Non-refereed conference papers	0.639***	0.019
	Abstracts in books of abstracts	0.586***	0.035

Note: ** statistically significant at 5%, *** statistically significant at 1%

Source: Croatian Scientific Bibliography, available at: <http://bib.irb.hr> (Accessed on: November 1, 2012); Authors' work

5. Conclusions

In this research we analysed the publication patterns of Croatian economics and business educational institutions in the period from 1991 to 1 November 2012. Our results revealed that scientific conference papers with international peer-review are the type of publications that researchers from institutions evidenced in CROSBIB published most commonly. Their number amounted to 4470 papers making conference papers with international peer-review the type of publications with the largest share in the total number of publications. Scientific papers in journals follow with the total of 3575 publications. Furthermore, book chapters with 1500 publications and other refereed conference papers with 1160 publications are well represented. The authors have also published 462 authored books, 191 edited books, and 130 textbooks.

Publications are concentrated in certain cities, i.e. faculties from the biggest Croatian cities (Zagreb, Osijek, Rijeka, Split and Varaždin) that generate the largest number of publications. Publications of articles in scientific journals in the most recent period (2007 – 1 November 2012) are characterized by co-authorship involving authors from one or more foreign countries, thus indicating the trend of internationalization. Furthermore, authors participate in an increasing number of international scientific conferences and this also contributes to the internationalization of economics and business scientific research.

If we observe the number of publications in different periods closely we can note an upward trend in

the number of published papers. For example, the number of book chapters increased greatly, starting with 13 publications in the period from 1991 to 1996, continuing with 275 publications in the period from 1996 to 2002 and 442 publications in the period from 2002 to 2007, and ending with 770 publications in the period from 2007 to 1 November 2012. One of the possible reasons for the increase in the number of scientific publications is the introduction of changes in legal regulations regarding advancements in scientific careers introduced in 1993, and later in 2005, and the constant improvement of these regulations resulting in stricter advancement criteria.

The bibliometric analysis revealed an increasing trend in the number of economics and business scientific publications. A large increase in the number of economics and business scientific publications is detected in the period after the introduction of changes in legal regulations regarding advancements in scientific careers. If measured by growth of publications in internationally recognized journals with an impact factor, and an increase in contributions to international conferences, economics and business scientific research develops towards internationalization. Also, a considerable number of publications resulted from international cooperation. However, an increase in the number of publications does not instantly indicate an increase in the quality of research. Therefore, future studies should focus on the quality of publications and not their number.

Results indicate a high concentration in the number of economics and business scientific publications

in certain cities. It appears that researchers from the faculties from Zagreb, Osijek, Split, Rijeka and Varaždin publish the largest proportion of papers, and those institutions are at the same time the most developed according to the number of educational programmes they offer. It has been noticed that institutions that offer only several programmes, i.e. polytechnics and colleges, are also less represented in publications in the Croatian Scientific Bibliography.

Readers should take into consideration the following limitations of the study. First, since the authors themselves enter the data for their publications, not all of the publications published by Croatian researchers are registered in CROSBIB, and this represents the major limitation of this study. Second, it is also important to mention that since we tracked publications by institutions, some of the publications are recorded two or more times, when their authors come from two or more institutions.

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ZNANSTVENA PRODUKTIVNOST HRVATSKIH EDUKACIJSKIH USTANOVA IZ PODRUČJA EKONOMIJE I POSLOVNE EKONOMIJE: POVEZANOST PRODUKTIVNOSTI I VELIČINE

SAŽETAK

Ovo istraživanje procjenjuje znanstvenu produktivnost hrvatskih edukacijskih ustanova iz područja ekonomije i poslovne ekonomije, pri čemu se usredotočuje na povezanost njihove veličine i produktivnosti. Provedena je bibliometrijska analiza za 13 edukacijskih ustanova čije su publikacije evidentirane u Hrvatskoj znanstvenoj bibliografiji (CROSBİ) za razdoblje od 1991. do studenoga 2012. Pronađeno je više od 4400 članaka objavljenih u znanstvenim međunarodnim konferencijama s međunarodnom recenzijom, 3500 znanstvenih članaka u časopisima, 1500 poglavlja u knjigama, 462 autorske knjige, 191 urednička knjiga i 130 udžbenika i priručnika. Bibliometrijska analiza je pokazala rastući trend u objavljivanju znanstvenih članaka za svako razdoblje promatranja u ovom istraživanju. Porast publiciranja je evidentiran kroz rastući broj poglavlja u knjigama, počevši od 13 publikacija u razdoblju od 1991. do 1996., preko 275 publikacija u razdoblju od 1996. do 2002., završavajući sa 770 publikacija u razdoblju od 2007. do studenoga 2012. Sličan trend je također primijećen za ostale vrste publikacija. Dodatno, broj akademskoga osoblja hrvatskih edukacijskih ustanova iz područja ekonomije i poslovne ekonomije uzet je u obzir u okviru istraživanja kako bi se generirali zaključci o povezanosti veličine institucije i njezine produktivnosti.

Ključne riječi: znanstvena produktivnost, ekonomija i poslovna ekonomija, Hrvatska, posttranzicija, trend