

Croatian Social Scientists' Productivity and a Bibliometric Study of Sociologists' Output

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ABSTRACT According to (pseudo)longitudinal empirical studies, the publication productivity of Croatian social scientists has been following the main global trends, especially the increase in co-authored and international/foreign publications. However, it shows more similarities to the social science output of other post-socialist countries than to the techno-scientifically developed European regions.

The most recent bibliometric study of sociologists' publication productivity offers a more detailed picture of social science publication practices, as well as a specific disciplinary culture. Books form an essential part of sociological and SS&H output and thus they should also be included in any system of research productivity monitoring and evaluation. Web of Science (WoS) and Google Scholar (GS) bibliographical and citation data bases differ in covering sociological publications (especially books), which results in considerably different indicators of the quantity and visibility of published output. Empirical typology of visibility of sociologists' publications detects the difference between article and book visibility, as well as local and international visibility combined with WoS and GS coverage. The predictors of visibility types suggest that increasing the impact of Croatian sociological research should be based on stimulating publication by sociologists in both international books and journals.

Key words: publication productivity, productivity patterns, productivity predictors, social scientists, questionnaire studies, bibliometric studies, sociologists.

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1. Introduction: Decoding the social scientists' productivity puzzle

The publication productivity of social scientists has recently come into the focus of (social) science studies. Prior to recent years, research production by scientists from individual social disciplines or specialties was only sporadically compared with the productivity of scientists from other fields (Small & Crane, 1979; Cole, 1979; Heffner, 1981; Wanner, Lewis & Gregorio, 1981; Peritz, 1983). Wider comparisons of output in various scientific areas – the natural, biomedical, social and humanist sciences, were rare (Kyvik, 1989), as was a comparative analysis of the productivity of different social sciences (Nederhof et al., 1989).

With the development and expansion of more complex evaluation systems in science, especially with the introduction of bibliometric indicators in the evaluation of social research and researchers, the interest of analysts of science in the social science productivity has also grown. In the meantime, theoretical approaches have already been developed for studying disciplinary differences and cultures, which form a possible conceptual basis for empirical studies of (social) science output.

Bibliometric studies are dominant, focused on research of the patterns and specific characteristics of social science production, and the disciplinary differences amongst them, on analyses of bibliographic and citation data bases for this scientific area, and on examining the characteristics of evaluation systems in science and their implications for the productivity of social scientists.

Moreover, international and national organizations, foundations and science agencies are launching projects, ordering comprehensive research and analyses of the development of social sciences, and drawing up agendas to promote this scientific area. The outcome of these efforts are well-known international (and some national) studies (Archambault & Vignola Gagné, 2004; Weingart & Schwechheimer, 2007; Hicks & Wang, 2009; Moed et al., 2009; DFG, 2010; Unesco-ISSC, 2010). Most often they analyse the possibilities and limitations of the use of bibliometric data in the social sciences. They also give recommendations for improving the existing and developing new (bibliometric) bases and indicators, in order to achieve more adequate monitoring and evaluation of the social sciences.

The studies show that the social sciences, in contrast to hard sciences, are characterized by a relatively high proportion of books, solo-authored studies, national and non-scholarly publications. They have established a growth in the total number of publications per social scientist, but also an increase in the share of their co-authored and international publications (Hicks, 1999, 2004; Narvaez-Berthelemot & Russel, 2001; Gülgöz, Yedekçioğlu & Yurtsever, 2002; Kyvik, 2003; Butler, 2003; Jeanin & Devillard, 2005; Nederhof, 2006; Van Leeuwen, 2006; Archambault et al., 2006; Kousha & Thelwall, 2009; Yang et al., 2010; Etxebarria & Gomez-Uranga, 2010; Haddow & Genoni, 2010).

The size and quality of the productivity of Croatian social scientists and how far it differs from world publication trends in that scientific area, will be shown by an overview of the main findings of Croatian investigations, and the results of the latest bibliometric study of the published output of sociologists.

2. Studies on the research productivity of Croatian social scientists

2.1. Theoretical and methodological approach

The publication productivity of Croatian (social) scientists has been investigated since the 1970s (Previšić, 1975). The first descriptive investigations were followed by the exploration of productivity determinants (Prpić, 1984). From the end of the eighties and the beginning of the nineties, the main goal of research into that topic has been to obtain comprehensive and longitudinal information about the trends, patterns and factors of scientists' productivity. The theoretical and hypothetical framework of these investigations has relied on organizational and cultural theories of science because of their capacity to plausibly explain the socio-cognitive differences between scientific fields (Whitley, 1984; Fuchs, 1992; Becher & Trowler, 2001). Scientific productivity could be understood as a manifestation of deeper differences in knowledge production and the corresponding social and intellectual organization (culture) of the individual sciences.

Questionnaire studies of research productivity, ensuring comparability of their findings, were conducted using samples of the overall Croatian research population in 1990 and 2004, or samples of the most interesting/important subgroups of researchers, such as eminent scientists (1995), young researchers (1998) as well as natural and social scientists (2004). The publication output of natural and social scientists has been explored recently (2007, 2008) using complementary bibliometric analyses.

2.2. Main findings about social scientists' publication productivity

Pre-transitional period. In the 1970s and at the beginning of the 1980s, Croatian social scientists were relatively more productive than their colleagues from other scientific fields, except for those from the humanities and medicine (Previšić, 1975; Prpić 1984).

The eve of transition. With an average number of 13.2 scientific and 10.3 non-scholarly or non-scientific works published in 1985-1989 period, Croatian social scientists were still the most productive researchers (Prpić, 1990:126). On average they were also more productive than Norwegian social scientists, who had 4.6 publications in a three-year period (Kyvik, 1989:208). The difference can be ascribed to the less rigorous peer review system of numerous Croatian non-scientific journals in SS&H fields at the time.

Transitional period. Fifteen years later, in the period of political, economic, social transition and science system changes, the average five-year productivity of the Croatian social scientists decreased to 9.5 scientific publications (Prpić & Brajdić Vuković, 2005:70). Having 5.7 publications in a three-year period, they became considerably less productive than their Norwegian counterparts, who had 7.9 publications in the same period (Kyvik, 2003:40).

Structural changes. Since the late eighties, the patterns of social scientists' research productivity have radically changed, especially the ratio of solo-authored to co-authored publications, as well as the ratio of international to local publications. The average five-year productivity of social scientists, which included 9.9 solo-authored and only 3.3 co-authored publications in the late 1980s, changed to 5.4 and 4.1 works respectively. The share of collaborative works increased from 25.0% to 43.2%. Finally, the number of papers in international publications (journals and books) per social scientist almost tripled from 0.8 to 2.3 (Prpić, 1990:126; Prpić & Brajdić Vuković, 2005:70).

Productivity predictors. Similarly to other findings (Wanner et al., 1981; Dunder & Lewis, 1998), the predictors of publication productivity differ across the scientific fields, especially in the social sciences (and humanities) as compared with other areas. These differences in publication productivity factors have been found repeatedly in Croatian empirical studies. In the second half of the eighties, the strongest predictive power of scientific ranks in the social sciences, in contrast to Ph.Ds in other fields, indicated that achieving a doctoral degree was not a crucial prerequisite for a social scientist's higher publication output in the socialist period (Prpić, 1991). A study from the mid-nineties found that early acquisition of academic degrees and ranks and the knowledge of foreign languages were the strongest predictors of eminent scientists' productivity in all fields. Disciplinary differences were still considerable in the constellation and strength of the contributing productivity factors (Prpić, 1996). The comparatively stronger impact of having a Ph.D. on the publication productivity of young social researchers, found in the late nineties, was self-explanatory among scientific novices (Prpić, 2000). Finally, according to an empirical comparison between natural and social scientists from 2004, the research output of the former was better explained by their international collaboration and engagement, whilst the productivity of the latter showed the stronger influence of local/national publication strategies and orientations (Prpić & Brajdić Vuković, 2009).

Bibliometric reflection. The first Croatian comprehensive bibliometric comparison of natural and social science output found that the latter is much less frequently published and cited in WoS journals than the former. In the 1996-2005 period, a social scientist had on average only 1 WoS publication, and an SS publication on average received 2.2 citations (Jokić & Šuljok, 2009:168/169). At the same time, according to Essential Science Indicators (1995-2005), the number of citations per social science paper on a global level was much higher – 3.38 (Jokić & Šuljok, 2009:155). Another study of the same data established that the quantity of papers

published in WoS journals was the most powerful predictor of the citations they received in both the social and the natural sciences (Prpić, Šuljok & Petrović, 2009).

2.3. The global and local/national context of social science productivity

The patterns, dynamics, and even predictors of Croatian social science productivity show some basic similarities found in questionnaire and bibliometric studies in other, very different, countries and societies (Wanner et al., 1981, Dundar & Lewis, 1998; Hicks 1999; Bjarnason & Sigfusdottir, 2002; Kyvik, 2003; Nederhof, 2006, Aaltojärvi et al., 2008; Gossart & Özman, 2009). These findings therefore suggest that social science publication output shares some common features typical for knowledge production in these fields regardless of their socio-cultural context. At the same time, the national/local impact of social and techno-scientific specificities is also evident in the studies of social scientists' productivity, including Croatian.

According to these studies, and also international comparisons, Croatian social research production appears to be related to the national (post)socialist scientific and socio-cultural system. Thus it lags behind the productivity level of the same fields in techno-scientifically more developed milieus/countries. Moreover, the visibility of Croatian social science output, indicated by the citations per publication, is more similar to the East European, less visible citation pattern than to the West European, which is considerably more visible.¹ This fact could be explained by the more parochial and less international orientation of social scientists in the former socialist countries, including Croatia (ex Yugoslavia), in spite of the relative openness of the country to international (scientific) communication. Finally, in the Croatian context, due to its (pre)transitional specificities, publication productivity in social sciences also displays some idiosyncrasies.

3. A bibliometric study of Croatian sociologists' scientific productivity

3.1. Is sociological output paradigmatic for social science publication productivity?

In studying social science productivity, sociology and some other fields, such as psychology, political science and economics, are treated (directly or indirectly) as

¹ International comparisons of social science production, that is papers in journals indexed in the Scopus base, show that Eastern European countries, with an average of 3.05 citations per study, do not attain even half the average visibility (citations) of Western European studies in social sciences. Croatia, however, with an average citation rate of 2.23 citations per document, lags even behind the average for transition countries. Source: SCImago. (2007). SJR – SCImago Journal & Country Rank. Retrieved January 27, 2011, from <http://www.scimagojr.com>.

representatives of that entire scientific area or as examples of variations within it (Kishida & Matsui, 1997; Babchuk, Keith & Peters, 1999; Najman & Hewitt, 2003; Sternberg & Ritzenberger, 2005; Mochnacki, Segaert & McLaughlin, 2009). Comprehensive comparisons of most or all of the social sciences are relatively rare, and usually contain little, or only the most basic information about publications and/or citations of researchers (Hicks, 1999, 2004; Gülgöz et al., 2002; Van Leeuwen, 2006; Nederhof, 2006; Yang et al., 2010). The results of these studies, however, confirm that disciplinary cultures form different publication patterns, despite their mutual similarities. Therefore no one social discipline is able to represent the entire scientific area, even sociology, which frequently finds itself somewhere between the hardest and the softest social sciences.

Studies of sociological output most often use bibliometric indicators and the span of their topics is wide, ranging from the knowledge production issues and professional recognition to the national productivity practices and patterns (Keith & Babchuk, 1994, 1998; Phelan, 1995; Winclawska, 1996; Hartley & Robinson, 2001; Pointille, 2003; Leahey & Reikowsky, 2008; Oromaner, 2008). The picture of sociologists' productivity from comparative analyses shows its disciplinary specifics, in terms of the type and visibility of publications. In contrast to economics, psychology or political science, which show considerable differences in the ratio of books to journal articles, in sociology the importance and also the share of the two main types of publications is more balanced (Bott & Hargens, 1991; Najman & Hewitt, 2003; Mochnacki et al., 2009). At the same time, the relationship between these types of publications within sociology itself varies depending on region, size and type of university, and according to the subject area or research specialty (Wolfe, 1990; Clemens et al., 1995). Solo-authored and co-authored publications are also relatively more frequent, at least in the journals with the highest impact factor in sociology (Babchuk, Keith & Peters, 1999; Moody, 2004; Hunter & Leahey, 2008). Finally, the findings on the visibility of sociology papers are very varied. For some, sociologists are somewhere between the most and the least cited social scientists (Najman & Hewitt, 2003), whilst others claim that they are the most cited (Phelan, 2000; Gülgöz et al., 2002). At the very least, they are not invisible, since the vast majority of sociological studies are in fact cited (Bott & Hargens, 1991).

In view of the obvious impact of the local social and scientific context on sociological production, shown by the results of many studies, it is only necessary to establish what and how much Croatian sociologists publish, since few investigations have dealt with that subject (Dukić, 1990; Lažnjak, 1990; Šporer, 1990; Štulhofer, Baćak & Šuljok, 2010) or it has only been touched on as part of a broader analysis of the social sciences (Jokić & Šuljok, 2009; Prpić & Brajdić Vuković, 2009).

The study by Jokić & Šuljok (2009) provided two indicators of sociological output in the period from 1996 to 2005. One shows the average number of publications (4.5) which lags behind the psychologists' average (11.3), but surpasses the average of the whole SS field (1.9), thanks to a very locally oriented WoS journal which

mainly publishes in the Croatian language. The other figure indicates the below average citation level of only one citation per sociological publication, in comparison with the average of 2.3 citations per publication for the whole SS area. The latter average was exceeded by kinesiology and psychology with 4.3 and 3.1 citations per publication respectively (Jokić & Šuljok, 2009:153, 155).

Additional bibliometric finding applies to the period from 1998 to 2008. Only 23% of Croatian sociologists, with the highest scientific ranks, published one or more papers in international journals indexed in WoS and Scopus, and only 7% of them were cited by foreign colleagues (Štulhofer et al., 2010:104/105). Though empirical insight into sociological output is very modest and partial, it indicates that Croatian sociologists are neither present nor visible on the international scientific scene.

3.2. Research design

The aim of the bibliometric study of scientific publications by Croatian sociologists was to gain a more complex picture of their research productivity and visibility, which would also contribute to deepening our knowledge of the published output in the social sciences, and offer an empirical basis for improving the evaluation system in this area. The more specific goals of this study were to establish:

- The structure, types and patterns of research production by sociologists, defined in the sense of their scientific publications. Productivity was observed over a long-term (career-long) period and in the short-term current project period of 2007 to 2009, or the beginning of 2010.²
- The visibility or citation rate of publications by sociologists, from the narrowest to the widest visibility in the scientific community, depending on the selectiveness or restrictiveness of the bibliographic and citation data base, which would make it possible to assess the suitability of each base for monitoring and evaluating production in the social sciences.
- Types of visibility of sociological publications on a national and international level, and their socio-demographic, professional, organizational and production-structural factors.

² The entry of data into the Croatian Scientific Bibliography (HZB) is not up to date, because data on publications from the previous year are often entered during the first few months of the current year, that is, just before writing the annual report on the realization of projects and published works. Since this practice is most common precisely in the social and human sciences, the data collected were those entered into the HZB up to the time this research was undertaken, since they mainly related to publications from 2009. Moreover, the last issues of journals from the previous year often come out at the beginning of the current year. The observed time-span in the search of the other two bibliographic and citation bases, WoS and Google Scholar, has been adjusted to this time shift.

The theoretical and hypothetical starting point for this study are the organizational and cultural theories mentioned, which allow assumptions about the common social and cognitive core of the (social) sciences but also their internal disciplinary differences (Whitley, 1984; Fuchs, 1992; Becher & Trowler, 2001). Moreover, these theories make it possible to respect the impact of the social context – in this case Croatia – on the production and dissemination of knowledge, and therefore to differentiate global, wider regional and national factors and characteristics of research productivity. Therefore, we expect that Croatian sociologists' publications will show some basic similarities with the world sociological output, but also specific characteristics for the Croatian and also the wider post-socialist social and scientific context. Consequently, we presume that scientific publications by Croatian sociologists, in terms of quantity and visibility, will lag behind sociological production in the techno-scientifically developed countries.

Since a comparison of sociological publication output according to different bibliographic and citation databases is of crucial cognitive but also of practical or policy importance, four data sets from three of the most relevant bibliographic or/and citation data bases were searched. In collecting data from each data base, equal authorship was assigned to each author of a co-authored publication regardless of his/her contribution. Consequently, the citations to a co-authored publication were assigned to each author too. Self-citations were also included. The data on 65 different features of sociologists' research productivity were collected from the following databases:

A. Croatian Scientific Bibliography (CSB, in Croatian HZB) established in 1996, includes bibliographic data on Croatian scientists' scientific and non-scientific published output, but also grey, not published output. Its advantage is its very comprehensive range so that a picture of the complete research productivity can be obtained. Within one week (8-15 May 2010) we collected data on sociologists' scientific (reviewed) publications: books, book chapters, journal articles and (complete) conference papers. Non-scientific publications (textbooks, reviews, conference abstracts) and unpublished output (research reports, conference presentations) were excluded. In that way the main flaw of CSB was mitigated. Namely, CBS consists of data self-recorded by the scientists themselves, which are not verified by information science experts and thus they include a large amount of output which has not been reviewed. Long-term (career) productivity included all scientific works published in the period from 1996 to May 2010, while short-term productivity covered publications in the period between 2007 and May 2010.

B. The Web of Science (WoS) bibliographic and citation data base is the most restrictive, the best known source, often criticized for covering selective and elite journals. It was included in our study for these very reasons. Searching was done during one week (8-15 May 2010) and two data sets were collected using an author's surname and the initial of his forename without diacritics. The result of author finder option was data on an author's works published in WoS covered journals, as well as citations of these publications in other WoS indexed papers

(narrow impact). A cited reference search resulted in citations to any publication by an author cited in WoS indexed journals (a wider impact). Under both options, articles, proceedings and theses were included, while reviews, editorials, meeting abstracts, items about individuals, letters and bibliographic material were excluded.

C. The Google Scholar Citation data base (GS), due to its comprehensiveness and availability, is a valuable source for citation analysis, in spite of its many inconsistencies, disadvantages and failures (Harzing, 2008). Data were gathered between 17 May and 10 June 2010 using the author's forename and surname, without diacritics. Only reviewed publications were included, as well as M. A. and Ph.D. theses. Close inspection of all cited and citing publications was done.

The study encompassed Ph.D. sociologists employed at scientific institutions registered by the Ministry of Science, Education and Sports (MSES). The electronic data set, with all the sociologists' names, their gender, age, research and academic rank and the name of their organization, were obtained from the MSES in April 2010. Young researchers, who had not attained their doctorate at the time, were excluded from the study, thus leaving 94 Ph.D. sociologists. The majority of them were men (61.7%), with the highest ranks (66.0%), and they were mostly employed at universities (62.8%). Their average age was 52.8 years.

The obtained data were submitted to additional control procedures and then to processing. Data processing using the SPSS program (version 15.0) included univariate, bivariate and multivariate methods – principal component analysis (PCA) and regression analyses.

3.3. Productivity and visibility of Croatian sociologists

The basic descriptive results for the most relevant features of sociologists' productivity and visibility, according to the Croatian Scientific Bibliography (CSB), the Web of Science (WoS) and the Google Scholar databases are presented in Table 1. The findings on the quantity and structure of Croatian sociologists' publication productivity and its impact, especially in comparison with the corresponding international indicators, suggest several tentative conclusions.

The structure of the published scientific output according to CSB data shows a similar proportion of journal articles (46.0%) and books including book chapters/papers (44.2%), thus corroborating other findings, which underline the importance of books in communicating sociological or social science results (Wolfe, 1990; Bott & Hargens, 1991; Hicks, 1999, 2004; Skrbis & Germov, 2004; Gläser, 2004; Nederhof, 2006; Mochnacki et al., 2009). For Croatian sociologists, it is obviously much easier to publish books than for Canadian sociologists, since 69.2% of the former published at least one book, while the corresponding share of the latter was 52.0% (Mochnacki et al., 2009:747). This disproportion could result from different systems

of financing scientific book publishing, since in Croatia, academic as well as commercial publishers used to receive financial support from the state.

Table 1

Croatian sociologists' publications and citations according to the Croatian Scientific Bibliography, Web of Science and Google Scholar databases (N=94)

	Scientific publications and/or citations		
	Sum	Mean	Share (%)
CSB – Croatian Scientific Bibliography			
All scientific publications 1996-2010	1901	22.9	100.0
Books published in 1996-2010 period	255	3.1	13.4
Chapters/papers in books (1996-2010)	586	7.1	30.8
Articles/papers in journals 1996-2010	847	10.5	46.0
Papers in conference proceedings 1996-2010	186	2.2	9.8
Publications (regardless of type) in foreign languages	496	6.0	26.1
Co-authored publications (regardless of publication type)	792	9.5	41.7
All scientific publications 2007-2010	539	6.5	28.3
WoS – Web of Science (SSCI, A&HCI) – narrow impact			
All papers published in journals covered by WoS	352	3.7	100.0
All papers in foreign/international journals indexed in WoS	91	1.0	23.4
All cited papers	154	1.6	43.7
All citations received	637	6.8	
Citations per publication		1.8	
Citations per cited publication		4.1	
All foreign citations (mean, share in all citations)	406	4.3	63.7
Foreign citations per cited publication		2.6	
Citations in 2007-2010 period (sum, mean, share in all citations)	272	2.9	42.7
WoS – Web of Science (SSCI, A&HCI) – wider impact			
All publications cited in WoS journals	882	9.4	100.0
All books cited in WoS journals	383	4.1	43.6
All citations received	1975	21.0	
Citations per publication		2.2	
All foreign citations (mean, share in all citations)	715	7.6	36.2
Foreign citations per cited publication		0.8	
All citations to books (sum, mean, share in all citations)	699	7.4	35.4
Citations in 2007-2010 period (sum, mean, share in all citations)	576	6.1	29.2
GS – Google Scholar Citations			
All cited publications indexed by Google Scholar	917	9.8	
All cited foreign/international publications indexed by GS	220	2.3	
All citations received	4192	44.6	
Citations per publication		4.6	
All foreign citations (mean, share in all citations)	2082	22.2	49.7
Foreign citations per publication		2.3	
All citations to books (mean, share in all citations)	1740	18.5	41.5
Citations in 2007-2010 period (sum, mean, share in all citations)	1590	16.9	37.9

Collaborative publications, with a share of 41.7% in the total output, also seem to fit into a broader picture of social science or sociological productivity. Kyvik (2003:42) found a very similar percentage (43%) of co-authored publications in social scientists' production, while American studies, focused on sociologists' article

productivity, established, of course, a higher portion of (nearly) 50% collaborative works (Babchuk et al., 1999; Hunter & Leahey, 2008). A very relevant indicator of collaborative work among Croatian sociologists is the small number of those who do not have any co-authored publication – 7.2%, suggesting that collaboration has been spreading fast in this small scientific community as well.

On the other hand, publications in foreign languages are much less represented in the total output of Croatian sociologists (26.1%) than of Norwegian social scientists – 51.0% (Kyvik, 2003:40), but their share is almost identical to that of Finnish SS&H scholars – 26.2% (Archambault & Vignola Gagné, 2004:17). The latter comparison is not adequate because the humanities are usually even more locally oriented than social sciences, therefore local orientation seems to be still more typical for social scientists in post-socialist countries than for their counterparts in the Nordic region and other developed parts of Europe.

The impact of Croatian sociologists' output considerably differs according to the different data sources – two sets of WoS data (more and less restrictive) and the even broader Google Scholar data (Table 1). The average number of (cited) publications and also citations is the lowest if we only observe papers in WoS journals and the citations they received in other WoS papers. These parameters are higher when all the publications cited in WoS papers are counted, and all of them reach the highest values if the Google Scholar citation counter is used. As an aggregate indicator of publications' quantity and impact, the h-index varies from 0 and 1 for output visibility, according to the more and less restrictive WoS data respectively, to 2 for GS visibility. Similar findings have been reported in several recent studies (Aaltojärvi et al., 2008; Etxebarria & Gomez-Uranga, 2010; Haddow & Genoni, 2010).

Our results, when compared internationally, reveal that the visibility of Croatian sociologists' publications is not satisfactory, although the majority of Croatian sociologists (77.7%) have published paper(s) in journals indexed in WoS, while a minority (22.3%) has not. Another indicator shows that only 13.8% sociologists have no publications cited on Google Scholar. Contrary to these data, two well-known studies found that almost one third of sociologists from Nordic countries had no publications in SSCI/SA in 2000, or publications on GS in 2005 (Aaltojärvi, 2008). Considering that Croatian sociologists have rarely published in foreign, international WoS journals (only 23.4% of them) it is clear that their research productivity is primarily local. They have mostly published in local journals indexed in WoS.

Though Croatian sociologists publish a smaller number of papers in WoS journals (3.7 per person) than Nordic faculty with an average of 4.5 papers per academic (Bjarnason & Sigfusdottir, 2002:259), even more important are the differences of the impact of sociologists' research results. With 4.1 citations per WoS publication, Croatian sociologists lag behind their Turkish colleagues, whose ISI publications in the long term received an average of 5.2 citations (Gülgöz et al., 2002), not to mention the Americans or sociologists from Nordic countries, with 14.3 citations per

publication and 18.2 citations per faculty respectively (Bott & Hargens, 1991:150; Bjarnason & Sigfusdottir, 2002:259).

The prevalently local character of Croatian sociological production is revealed by more detailed research data, such as the high proportion of sociologists: a) without papers in international/foreign WoS journals; b) without foreign WoS citations of their WoS papers (75.5%) or foreign WoS citations of any publication (50.0%); c) without any foreign/international publication cited on Google (56.4%). This feature of sociology productivity is shared with other East European, ex-socialist countries, still lagging behind their western European counterparts. The median value of the h-index in sociology and political science, according to the Scopus database, is 3 for the former and 21 for the latter. Croatian output in these fields reached an h-index of 4, somewhat higher than the EE average (SCImago, 2007).

3.4. *Visibility typology*

Since the visibility of Croatian sociologists' published output has not been previously examined, a deeper insight into the impact of their publications had to be obtained. In order to establish the visibility typology of sociologists' output, a principal component analysis (PCA) using varimax rotation was conducted of 33 items, comprising citation related data according to WoS and GS. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .884, well above the recommended .70. Four components were extracted by the use of the Kaiser criterion. They explained 88.4% of the variance. Internal consistency of each component assessed, using Cronbach's alpha (CA), was very high, above .90. The rotated component matrix with correlations $\geq .40$ is presented in Table 2.

The first component consists of thirteen items. Due to its highest correlations with receiving (foreign) citations both for sociologists' WoS and other publications cited in WoS, this component can be interpreted as *international WoS visibility*. It includes both the narrow and broader impact of the published output, implying that publications by these sociologists, published either in WoS journals or elsewhere (including books), are recognized and used by their colleagues, especially in the international scientific community. International WoS visibility is also correlated with authors' self-citations in WoS publications and with citations received on GS, thus indicating its connection with Google Scholar visibility as well.

The second component encompassed all ten Google Scholar visibility items. Therefore it can be termed: *(inter)national web visibility*. This type of visibility shows the highest correlations with the impact of sociologists' books and foreign publications, with international and recent impact and self-citations. Consequently, internet (web) recognition constitutes a broader type of international and national visibility, which includes the impact of scientific books underrated by WoS citations.

Table 2

PC analyses of Croatian sociologists' output visibility: varimax rotated component matrix – correlations $\geq .40$

Visibility items	Components			
	I	II	III	IV
All WoS citations (narrow impact)	.944	-	-	-
All foreign citations in WoS (narrow impact)	.924	-	-	-
WoS citations 2007-2010 (narrow impact)	.892	-	-	-
H-index – WoS narrow impact	.862	-	-	-
Foreign WoS citations to WoS and other publications (wider impact)	.846	-	-	-
Foreign WoS citations 2007-2010 to WoS and other publications (wider impact)	.839	-	.431	-
WoS citations per any kind of publication (wider impact)	.833	-	-	-
WoS citations per WoS publication (narrow impact)	.833	-	-	-
WoS citations 2007-2010 to WoS and other publications (wider impact)	.772	-	.424	-
WoS citations to WoS and other publications (wider impact)	.753	-	-	.514
Cited WoS papers (narrow impact)	.736	-	.540	-
H-index - WoS wider impact	.734	-	-	.536
Proportion of citations to WoS papers in all WoS citations	.626	-	-	-
All GS citations	-	.941	-	-
GS citations to books	-	.933	-	-
Foreign GS citations	-	.931	-	-
GS citations 2007-2010	-	.873	-	-
GS self-citations	-	.867	-	-
Foreign publications cited on GS	-	.832	-	-
H-index – GS	-	.723	-	.425
GS citations per publication	.520	.656	-	-
Publications cited in 2007-2010 period	-	.655	-	.522
All publications cited on GS	-	.637	-	.577
WoS citations to published papers in 2007-2010 period (narrow impact)	-	-	.918	-
Cited WoS papers published in 2007-2010 period (narrow impact)	-	-	.884	-
WoS citations to WoS and other publications from 2007-2010 period (wider impact)	-	-	.834	-
Foreign WoS citations to WoS and other publications from 2007-2010 period (wider impact)	-	-	-	-
WoS self-citations (narrow impact)	.567	-	.618	-
Self-citations to all publications cited in WoS (wider impact)	.448	-	.525	.448
WoS citations to books (wider impact)	-	-	-	.913
WoS cited books (wider impact)	-	-	-	.909
All publications cited in WoS (wider impact)	-	-	.441	.763
WoS cited publications from 2007-2010 period (wider impact)	-	-	.581	.670
Eigenvalues	19.183	4.638	3.523	1.846
% of explained variance	58.1	14.0	10.7	5.6
Cumulative % of explained variance	58.1	72.2	82.8	88.4
Cronbach's Alpha	.980	.972	.951	.948

The six items constituting the third component are primarily connected to the narrow and broader visibility of recent sociological publications in WoS, and for that reason it can be labelled: *recent (inter)national WoS visibility*. It includes citations to Croatian sociologists' recent WoS and other publications and, similar to the first component, is also not too restrictive. Although foreign citations to recent publica-

tions constitute one of the items highly correlated with the component, it is not the strongest nor is it accompanied with other items showing international impact. Thus the third type seems to be a mixture of both the national and international visibility of Croatian sociological output.

Finally, the fourth component consists of four items but shows the strongest association with sociologists' books cited in papers published in WoS covered journals, while its connection with the impact of complete or recent WoS output is of significantly lower intensity. Since there is no correlation of the component with any item indicating the international impact of books, it may be labelled: *local books' visibility*. However this type of visibility is also connected with several GS and WoS items, which additionally suggest the important local impact of sociological books.

These visibility types are partially in accordance with some theoretical assumptions and also the empirical findings of social science productivity studies. The distinction between four types of social science literature (international journal articles, books, national and non-scholarly publications) made by Hicks (2004) is useful in interpreting visibility typology. The results of empirical studies show that the overlap between different visibility types and data bases is often small. Gossart & Özman (2009) found two different populations of Turkish social scientists with very little cross-over between them: those who publish mostly in international journals and others oriented to the national audience. Etxebarria & Gomez-Uranga (2010) also mention internationally visible social scientists and Spanish scientists, barely mentioned in international databases but recognized nationally. Aaltojärvi and collaborators (2008) conclude that the internationalization of the social sciences is growing and international books are particularly frequently cited on GS, while international journal articles are cited in SSCI (WoS) almost as often.

The visibility typology obtained of Croatian sociologists' output reflects a distinction between the kinds of sociological output – journal papers and books, international-national publications – but also the difference in the coverage of the databases – WoS and Google Scholar. Croatian sociologists' visibility manifests combined types of international recognition of WoS output, web visible publications (books), recent WoS publications visibility and the national or local impact of the books. These types combine the characteristics found in other studies and some features that may be specific for the Croatian context. Which factors can help in explaining visibility types remains to be analyzed.

3.5. Explaining visibility types

Multiple linear regressions were used to explain the types of sociologists' visibility or the impact of their publications. The only socio-demographic and professional characteristics of sociologists registered by the Croatian Ministry of Science Education and Sport were gender, age, research rank and type of scientific institution or

organisation. Those variables, as well as the characteristics of the sociologists' published output, were treated as predictors, while the types of production (varimax components) were criteria.³ Since a more profound analysis of scientific visibility would require a more complex predictor set, our research goal was predictive, that is primarily to establish the contribution of the characteristics of sociologists' output to predicting its visibility. Therefore we used a stepwise regression procedure rather than the hierarchical regression analysis recommended in theory testing.

Table 3
Significant predictors of sociologists' visibility types – statistically significant betas (p<.05)

	Visibility types (varimax components)			
	I	II	III	IV
	Beta	Beta	Beta	Beta
Age	-	-	-	.508
Book chapters/papers	-	-	-	.194
Journal articles	-	-.431	-	-
Papers in foreign languages in international publications	-.281	.498	-	-
Scientific publications 2007-2010	-.138	.583	-	-
Papers published in WoS journals	.726	-	-	.595
Papers in international WoS journals	.649	-	-	-.632
WoS papers in 2007-2010 period	-.538	-	.753	.278
R (multiple correlation)	.877	.730	.753	.750
R2 adjusted (multiple determination)	.754	.516	.561	.534
F (p<.001)	51.336	30.102	105.871	19.787

The obtained coefficients of determination (ranging from 75.4% to 51.6%) indicate that each of the four types of sociologists' visibility is to a rather high degree explained by significant predictors, which are mostly the characteristics of published output. As expected, the socio-demographic and professional characteristics of Croatian sociologists, except for age, have not contributed to their publication visibility.

With three quarters of its variance accounted for, the *international WoS visibility* is the best explained visibility type. The predictors, whose contribution to this type of the impact of sociological output is the greatest and almost the same, are the quantity of papers published in international journals covered by WoS, and of papers in all WoS journals – 47.1% and 47.0% respectively. Other significant predic-

³ The set of predictors included the following characteristics of sociologists' published output according to CSB: books, book chapters, journal articles, papers in conference proceedings, then publications regardless of type – in foreign languages, in international books and journals, co-authored works and recent publications (2007-2010). The set also included three WoS variables – papers in WoS covered journals, papers in WoS international journals and recent papers in WoS journals (2007-2010).

tors contribute to a much smaller degree to the variance explanation. It is interesting that the contribution of papers in foreign languages in international publications and recent WoS papers, to the sociologists' international visibility is negative (-10.4% and -8.1% respectively), contrary to all recent publications, which explains the smallest amount of variance: 1.4%. This type of visibility obviously depends on (relatively) frequent publishing in WoS journals, primarily foreign/international ones and most probably is long term or accumulated collegial recognition in sociology and related scientific communities.

The second type, *(inter)national web visibility*, is explained to the comparatively lowest degree (51.6%) by the significant predictors. The significant factors that participate in explaining the visibility variance are: recent scientific production (32.0%), papers in foreign/international publications (26.2%) primarily books, since the contribution of journal articles is small but negative (-4.9%). Such visibility is achieved through book production and represents an important kind of reputation in many social sciences and can principally be won, particularly international impact, on the internet.

A significant predictor, which alone explains the considerable amount of variance (56.1%) of the *recent (inter)national WoS visibility* of Croatian sociologists, is their productivity in the 2007-2010 period, that is, papers published in WoS indexed journals. This type of visibility, achieved in the last few years, could be understood as an indicator of the untypically short period for citing new publications in social sciences, where the literature shows longevity, in contrast to the hard sciences, which are characterized by the rapid obsolescence of literature. The obsolescence may be expected to accelerate in social sciences as well.

Several predictors contribute to *local books' visibility* (53.4% of the variance accounted for). The most powerful are sociologists' (older) age and papers in WoS journals, which explain the 22.8% and 20.0% variance respectively. The contributions of recent WoS paper production and book chapter output are lower – 8.9% and 7.9% of the variance – while foreign WoS papers contribute negatively to the variance explanation (-3.5%). The composition of the predictors strongly suggests that this local visibility is achieved through citations to books in local WoS journals in the Croatian language, and that it is obviously cumulative during sociologists' careers.

These regressions have shown two important formative features of Croatian sociologists' visibility, in spite of the fact that, socially and professionally, more complex predictors were not available or used. Firstly, they indicate that the publication quantity and visibility of scientific output or even its quality (often uncritically equalized with visibility) might be closely related, not only in the natural sciences (Cole & Cole, 1981; Sonnert, 1995), but also in a social science. The latter was already indicated in our previous bibliometric study, showing that the quantity of publications, when introduced in the analysis, becomes the most powerful predictor of their visibility, in both natural and social sciences (Prpić, Šuljok & Petrović,

2009). Secondly, the Croatian specificity might be the relationship between local/national visibility, especially regarding books in the Croatian language, and publications in WoS covered local journals, since there are no comparable data for other (transitional) countries. The impact of local books is always seen in local journals, but in a small sociological community such as the Croatian one, with a few local journals indexed in the most selective citation database, WoS visibility is mostly local or national visibility.

4. Conclusions

The publication productivity of Croatian social scientists does share basic common features and patterns with the international social science output. The specificities of these features, as compared with other sciences, hard sciences in particular, corroborate the theses of organizational and cultural theories of science. On the other hand, they should be taken into consideration in various (national) models of output monitoring and evaluation. However, Croatian social science output, especially regarding its generally small international visibility, shows a greater similarity to the output of other post-socialist countries than to the techno-scientifically developed European regions, due to the differences in political and socio-economic history and development. The impact of the specific Croatian socio-cultural and scientific context on social science knowledge production can only be clearly displayed in more detailed comparative studies, which may be expected in future.

A deeper insight into the sociologists' publication productivity offers a more detailed picture of social science publication practices, as well as the specific disciplinary culture. Books do form a crucial part of sociological and SS&H output (Wolfe, 1990; Bott & Hargens, 1991; Clemens et al., 1995; Bjarnason & Sigfusdottir, 2002; Gläser, 2004; Mochnacki et al., 2009). Moreover, journal articles and books (including book chapters) are almost equally represented in the output of Croatian sociologists. Co-authored publications follow the typical disciplinary pattern also found in other studies. However, Croatian sociological publications differ considerably in internationalization, at least when compared with Scandinavian sociologists' output (Kyvik, 2003; Aaltojärvi, 2008). Although this is too high a standard for comparison because of the huge disparity between Croatian and Scandinavian techno-economic development, science systems and investment in science, yet the provinciality of sociological output also implies that it is unknown on the international scene.

Consequently the visibility of Croatian sociologists' publications is comparatively low. The obtained typology of output visibility combines the visibility of articles and books as well as national and international impact and the combinations are connected with the citation data base coverage. Web of Science and Google Scholar manifest very different coverage (especially regarding books), which results in considerably different indicators of the quantity and visibility of sociologists' published output. Thus Croatian sociologists' visibility manifests the types of

international recognition of WoS output, web visible publications (books), recent WoS publications visibility and the national or local impact of books. They are to a relatively high degree explained by the features of the sociologists' publication production, showing that in the Croatian scientific context, usually exclusive WoS coverage does not necessarily explain international impact exclusively, but also the national impact of national production, notably book production.

Since Thompson Scientific has recently increased the number of Croatian social science journals indexed in the WoS data base, the same tendency found in sociology might be expected to continue in the field and in social sciences in general, unless science policy is changed. A clear policy recommendation for the Croatian social science community and decision makers would be the following: If the impact of research results in the social sciences is to be increased, so that they are better known and evaluated on the international scene, the key measure should be stimulating international or/and foreign publication by Croatian social scientists. This recommendation also applies to sociological (scientific) community and professional association.

The implications of the differences in the WoS and GS data base coverage are both methodological and practical. The differences are also significant within the WoS database, which contains two sets of data. The most restrictive one only registers, as has been shown, articles in WoS and is therefore the least adequate data source for monitoring and evaluating the social sciences. The second, that includes citations of all publications (including books), being less restrictive, is somewhat more adequate for an analysis of social science output. In spite of its numerous flaws and problems, GS has the widest coverage of publications for both studying and evaluating the quantity and impact of published output in sociology and related sciences (Harzing, 2008; Kousha & Thelwall, 2009).

Nevertheless, these and other bibliographic and citation data bases must be used carefully in research and assessment of social science output. Their coverage should be broadened according to the specificities of the social sciences and special, for SS&H fields, more adequate data base(s) could and should be established (Unesco-ISSC, 2010). Furthermore, quantitative, bibliometric indicators of publication productivity in social sciences cannot exclude or replace a qualitative approach, either in research into or assessment of scientific performance.

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Produktivnost hrvatskih društvoznanstvenika i bibliometrijsko istraživanje sociološke produkcije

Sažetak

Prema (pseudo)longitudinalnim empirijskim studijama, znanstvena produktivnost hrvatskih društvoznanstvenika prati glavne globalne trendove, posebno porast koautorskih i međunarodnih/stranih publikacija. No, ona pokazuje više sličnosti s autputom društvenih znanosti drugih postsocijalističkih država nego sa znanstveno-tehnološki razvijenim evropskim regijama.

Najnovije bibliometrijsko istraživanje sociološke znanstvene produktivnosti nudi detaljniju sliku objavljiivačkih praksi društvenih znanosti, kao i sliku jedne specifične disciplinarne kulture. Knjige čine esencijalni dio sociološke i društveno-humanističke produkcije, te bi stoga trebale biti uključene u svaki sustav praćenja i vrednovanja znanstvene produktivnosti. Web of Science (WoS) i Google Scholar (GS) baze razlikuju se u obuhvatu socioloških publikacija (posebno knjiga) što rezultira značajno različitim pokazateljima brojnosti i vidljivosti objavljene produkcije. Empirijska tipologija vidljivosti socioloških publikacija otkriva razliku između odjeka članaka i knjiga, kao i lokalne i međunarodne vidljivosti u kombinaciji s WoS i GS obuhvatom. Prediktori tipova vidljivosti sugeriraju da bi povećanje odjeka hrvatskih socioloških istraživanja trebalo temeljiti na poticanju sociologa na objavljivanje u inozemnim knjigama i časopisima.

Ključne riječi: znanstvena produktivnost, obrasci produktivnosti, prediktori produktivnosti, društvoznanstvenici, anketna istraživanja, bibliometrijske studije, sociolozi.

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