ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume 64 28 Number 1, 2016
http://dx.doi.org/10.11118/actaun201664010245

IMPACT OF SCORE RECALCULATION OF PUBLICATION EVALUATION ON THE CZECH HIGHER EDUCATION INSTITUTIONS

Martin Flégl[1], Igor Krejčí[2], Helena Brožová[2]

[1] Business School, University La Salle, Benjamin Franklin 47, 06140, Mexico City, Mexico
[2] Department of Systems Engineering, Faculty of Economics and Management, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Praha, Czech Republic

Abstract

FLÉGL MARTIN, KREJČÍ IGOR, BROŽOVÁ HELENA. 2016. Impact of Score Recalculation of Publication Evaluation on the Czech Higher Education Institutions. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis,* 64(1): 245–254.

The evaluation of the publication outputs in the Czech Republic is based on the methodology from the Research, Development and Innovation Council. This methodology assigns a score to each output according to a various categories. The evaluation is carried out for 5 year-long sliding period. However, the assigned score for an output is published with more than a year delay. Moreover, the assigned score, in most of the cases, does not correspond with the scientists' first calculation, which was made according to the generally known rules. The impact of this issue on the chosen scientific organisations, Higher Education Institutions (HEIs), is the topic of this paper. The evaluation and analysis of the financial impact of this gap on the Czech higher education institutions' budgets is provided with data from the years 2007 to 2012.

Keywords: science metrics, RIV points, higher education institutions, publication activity, research, Development and Innovation Council

INTRODUCTION

Can you imagine a market, where you sell a product but its price would be stated approximately a year later after the realisation of the trade? Nowadays, the scientists plan their publication activity without the exact knowledge of its evaluation. Significant part of the evaluation of the Czech scientific organisations is based on the publication outputs, such as articles in scientific journals, conference proceedings, books etc. Research, Development and Innovation Council (RVVI) defines an approach for an assignment of the exact amount of so called RIV points to each publication output (Research, Development and Innovation Council, 2013). Nevertheless, each year these RIV points are recalculated and converted into the real money from the budget of the Ministry of Education, Youth and Sport (MEYS) according to the rules, which impact is not exactly predictable. Despite the methodology is fully described, the whole evaluation process uses data that are not fully known at the time of the publication. This fact leads to an information shortage.

This direct connection between HEIs' funding and publication outputs has brought a new form of competition into the Czech higher education system. This competition is in addition to the other forms of competition such as competition for students, international status etc. (see e.g. Schüller *et al.* (2014) or Foltýnek and Rybička (2013)). Managements of the most of the HEIs usually react to this new form of competition by creating internal motivation programmes to stimulate the scientists' publication outputs. Furthermore, official published RIV points serve as one of the evaluation criteria for performance analyses among either HEIs or academics.

For example, Stoklasa, Talašová and Holeček (2012) use model based on fuzzy logic for evaluation of academics' performance. Nevertheless, they define the RIV points before recalculation as an input for research and development. Vltavská and Fischer (2013) evaluate the labour productivity of

HEIs' employees according to the teaching and research productivity. Furthermore, Flégl and Vltavská (2014) present the efficiency analysis of the Faculties of Economics using Data Envelopement Analysis and production function analysis with similar data sources. Dlouhý (2012) proposed a model for funding allocation among HEI's departments. This model was based, among others, on publication productivity of each department. These authors apply methods, which are commonly used on production units in the market. In addition, Jablonský (2014) presents a performance analysis for Czech scientists with respect to their publication activities. The author also discusses the potential of bibliometric indicators as a tool for department, faculties or HEIs evaluations.

It is possible to identify the origin of the current publication evaluation in the RVVI methodology from 2006 (Research, Development and Innovation Council, 2006). Since 2006, this methodology of evaluation of the results of research organizations and results of finished programmes (Methodology) has been many times discussed, changed and developed.

The methods for evaluation have been intensively discussed within the field of scientific policy. The main goal of the evaluation is to provide information about research results that were created with a financial support from the public resources, mainly from MEYS budget. Furthermore, it is also necessary to gain an insight into the efficiency of such funding. The quantitative evaluation of the research organisations has direct implications on funding of HEIs, research organisations and many others. From this point of view, the achieved RIV points indicate the scientific productivity of an organisation (Flégl, Tichá and Kvasničková Stanislavská, 2013).

Even though the RIV points are widely used for performance analyses, the Methodology has many weaknesses. Jurajda and Münich (2012) point out that the Methodology does not reflect the different publication activities in different disciplines. For the evaluation of research quality, the authors focus only on papers with impact factor indexed in Web of Science. Jurajda and Münich stress the impropriety of the impact factor value for interdisciplinary comparison (Methodology also reflects the order of journal in the category as a reflection of disciplines' differences). Similarly, Arnold *et al.* (2011: 141–142) also identify that the Methodology unequally treats different disciplines such as Arts and Humanities, Mathematical Sciences, Chemical Sciences etc.

The possible solution of this weakness would be in dividing the MEYS budged regarding different disciplines along with different acceptable outputs in various disciplines (Research, Development and Innovation Council, 2013: 34).

On the other hand, such recalculation of RIV points has consequences in impossibility of estimation of the point value of an individual research output. It is impossible to say whether the publication output gets more or less points, than the Methodology initially states (Tab. I). The difference can change every year, but the authors and HEIs' management might not know this change until the next year, when the final RIV points are released. Generally, the lack of information (or the misunderstanding of the information) has a negative impact on the competition at the market. Information gap is connected with instability and uncertainty, which disturbs the economic behaviour of market participants (Samuelson and Nordhaus, 2009). Lack of the information and limited possibility to handle the information is archetypical source of bounded rationality. Decision makers (and therefore the overall system) do not achieve the optimal solution, but try to reach a satisfactory solution (Simon, 1956, 1991). As a result, we can refer to scientists' decision-making uncertainty in the Czech higher education system.

The main objective of this paper is to evaluate the impact of the recalculation of the publication outputs on the HEI's budgets. The main data sources are officially published data from RVVI and the budget of MEYS.

The article is structured as follows; the first part includes a brief description of analysed problem. Following section explains the RVVI methodology of the publication outputs evaluation. The main part of the article is devoted to the results. We provide detailed results with the impact on the HEIs funding. The article concludes with a discussion related to the application and limitation of the achieved results. The conclusion proposes future research tasks.

MATERIAL AND METHODS

Evaluation Methodology of Research Organizations and Finished Programmes

The key database for the evaluation of scientific work in the Czech Republic is Information Register of R & D results (RIV). Scientific work is evaluated according to the Methodology valid for particular period of time and is carried out by the RVVI. The evaluation is always based on a sliding 5-year-long period and includes all applied results in particular years (e.g. publication outputs from the years 2008–2012 are used for the budget redistribution in the year 2015).

The current Methodology (Research, Development and Innovation Council, 2013), which is valid for the years 2013 and 2015, is structured into three connected pillars:

- Pillar I – Evaluation of the publication results;
- Pillar II – Evaluation of the quality of selected results;
- Pillar III – Evaluation of patents and non-publication results of the applied research.

For the evaluation in the year 2013, only Pillars I and III are applied. Pillar II will be applied for the first time for the year 2014. In the year 2013, the default score allocated for a given HEI in Pillar II is 1/9 of the total amount of RIV points, which HEIs received according to Pillar I and Pillar II (Research, Development and Innovation Council, 2013).

In this analysis, we focus only on the Pillar I and its result types, which represent the publication outputs that could be directly evaluated by RIV points in both examined periods (Research, Development and Innovation Council, 2013: 34):

- J_{imp} – article in a periodical registered in the Web of Science (WoS),
- J_{sc} – article in a source registered in SCOPUS, which is not registered in WoS,
- J_{neimp} – article in a reviewed periodical in the ERIH database, which is not registered either in WoS or SCOPUS,
- J_{rec} – article in a journal in a list of reviewed Czech periodicals, which is not registered in WoS, SCOPUS, or ERIH,
- D – article in proceedings, which is registered in the database Conference Proceedings Citation Index – Science or Social Science & Humanities of the Thomson Reuters, or in the SCOPUS database.

In our analysis, the category specialists books (B) and chapters (C) is not taken into account due to the expert evaluation firstly applied on the period 2008–2012.

Individual result types in Pillar I receive points according to the Methodology scoring system (Tab. I). Detailed explanation of the scoring methodology is published in Methodology (Research, Development and Innovation Council, 2013).

Up to this step, the HEIs' managements are able to evaluate the outputs by themselves and to reflect the findings into the motivation of scientists. Nevertheless, to balance the different situation in different fields, the Methodology also states the maximum points for every field of science. Moreover, since the year 2013 (firstly applied on the results of 2012) the Methodology (Research, Development and Innovation Council, 2013: 53–54) also states the maximum share of result type in the specified fields (Tab. II). Consequently, the initial RIV point value of publication outputs is changed. Initially assigned RIV points are proportionally recalculated in the way that the sum of all points in a category does not exceed the total limit for the category and the type of the result. Then, the MEYS budget is divided to HEIs on the basis of the recalculated points. Since 2014 RIV points of books or chapters in a book (BC) are subjected to an expert evaluation by points from the interval 4–120 in contrast to Tab. I (Research, Development and Innovation Council, 2013: 34).

Evaluated Higher Education Institutions

The analysis is based on the R & D results of all 26 public Higher Education Institutions[1] in the

I: *Scoring of publication results in 2013*

Result type				Fields SHVa, SHVb	Other fields within the given result type is evaluated
J_{imp}	Article in an impacted periodical				10–305
J_{sc}	Article in the Scopus database				10–305
J_{neimp}	Article in the ERIH database	INT 1		30	12
		INT 2		20	11
		NAT		10	10
J_{rec}	Article in a periodical included in the list of reviewed periodicals			4	0
B	Specialist book	Global Language	English, Chinese, French, German, Russian, and Spanish	40	40
		Other language			20
D	Article in proceedings				8–60

Research, Development and Innovation Council, 2013: 34

1 Academy of Performing Arts in Prague (AMU), Academy of Fine Arts in Prague (AVU), Czech University of Life Sciences Prague (CZU), Czech Technical University in Prague (CVUT), Janáček Academy of Music and Performing Arts in Brno (JAMU), University of South Bohemia in České Budějovice (JCU), Masaryk University (MUNI), Mendel University in Brno (MENDELU), University of Ostrava (OUO), Silesian University in Opava (SUO), Technical University of Liberec (TUL), University of Hradec Králové (UHK), Jan Evangelista Purkyně University in Ústí nad Labem (UJEP), Charles University (UK), Palacký University Olomouc (UPAL), University of Pardubice (UPAR), Tomas Bata University in Zlín (UTB), University of Veterinary and Pharmace (VFU), VSB-Technical University of Ostrava (VSB-TUO), University of Economics Prague (VSE), Institute of Chemical Technology Prague (VSCHT), College of Polytechnics in Jihlava (VSPJ), Institute of Technology and Business in České Budějovice (VSTE), Academy of Arts, Architecture and Design in Prague (VSUP), Brno University of Technology (VUT) and University of West Bohemia (ZCU).

II: *Limits of point values and percentages of individual result types*

Field group	Percentage limits for individual types of publication results						Total limit (RIV points)
	Jimp	Jsc	Jneimp	Jrec	BC	D	
Arts and Humanities (SHVa)		30%		13%	55%	2%	43920
Humanities (SHVb)		30%		15%	53%	2%	32460
Humanities (SHVc)		55%		0%	40%	5%	17220
Technical Sciences and Informatics	65%		0%		9%	26%	101700
Agricultural Sciences	93%		0%		5%	2%	29760
Earth Sciences	95%		0%		5%	0%	30360
Mathematical Sciences	92%		0%		3%	5%	22860
Physical Sciences	100%			0%			90480
Chemical Sciences	100%			0%			94800
Biological Sciences	100%			0%			72000
Medical Sciences	100%			0%			64440
TOTAL							600000

Research, Development and Innovation Council, 2013: 49

Czech Republic (MEYS, 2014c). The data were collected for the period 2007–2012. These years include two sliding RIV periods, i.e. 2007–2011 and 2008–2012 respectively. The impact of the R & D results on HEIs' funding is presented in Tab. III, which shows the changes of funding from the budget of MEYS (2013) in thousands Czech crowns.

To express the difference between the final RIV points published by RVVI and the initial RIV points calculated by all HEIs on the basis of Tab. I, we analyse more than 79 thousand of accepted entries for the period 2007–2011 and more than 89 thousand of accepted entries for the period 2008–2012. As a result, we examine the impact of the recalculated final RIV points on the budgets of all HEIs.

RESULTS

Tab. III shows the change between the application of rules from Tab. I (initial RIV points) and their recalculation according to the Tab. II, on the basis of discipline and type of publication (type of publication is relevant only for year 2012). The R & D results from the years 2008–2012 affects funding for the year 2015. Therefore, Tab. III does not include related funding yet; impact is expressed in terms of budget 2014.

Tab. III is divided into two parts: period 2007–2011 and period 2008–2012. Columns 'Initial RIV points' contain RIV points obtained on the basis of calculation according to the Tab. I. This is the information accessible from the beginning with the exception of rejection of publications due to administrative failures etc. Columns 'Final RIV points' represent RIV points published by RVVI after re-evaluation by the discipline and type of publication result (for 2012). Tab. III also includes the official budget and budget redistributed on the basis of the initial RIV points. Columns 'Change by re-evaluation' express the modification of the budget caused by the re-evaluation of the RIV points.

The biggest absolute change in the period 2007–2011 is for Charles University (UK). Drop by –6.5 million CZK means nearly 2.5% of UK's budget directly related to the RIV points. On the other side, Institute of Chemical Technology Prague (VSCHT) achieves the highest positive change, VSCHT gains higher funding from MEYS budget than initial RIV points of the Methodology predicts. The growth by 4.2 million CZK in 2007–2011 (resp. 3.5 million CZK in 2008–2012) significates 11.3% (resp. 9.4%) of its official funding from the MEYS budget. Institute of Technology and Business in České Budějovice (VSTE) reached the biggest relative change; the earnings from publications in 2013 (2007–2011) was more than doubled due to the re-evaluation according to the Methodology.

Tab. III shows that individual growth of RIV points does not necessarily mean a growth of the funding. Total budged is stated by MEYS and divided by the share of the RIV points. Thus the change of funding depends on the relative change of RIV points to the sum of all RIV points.

Tab. IV and Tab. V show the relative changes between the final and the initial RIV points with respect to the different disciplines of science and the limits of the total point amount. If the limit of points was exceeded, then the re-evaluation leads to a smaller number of final RIV points and vice versa. Since both periods have significant intersection, relative changes are stable for the disciplines.

Fundamental change has been achieved in calculation of 2012. Once the maxima of RIV points are also stated for all types of publication results (Jimp, Jneimp etc.), the behaviour significantly changes. If the percentage maximum of result type is not reached, then the remaining points are transferred to the category of Articles in impacted periodicals (Jimp). As a result, the Jimp category can have a different ratio than Jsc or Jneimp, despite the

III: *Impact of re-evaluation*

HEI	2007–2011					2008–2012				
	Initial RIV points	Final RIV points	Initial Budged (thousand CZK)	Final Budget (thousand CZK)	Change by re-evaluation	Initial RIV points	Final RIV points	Initial Budged (thousand CZK)	Final Budget (thousand CZK)	Change by re-evaluation
AMU	5646.77	5817.9	2920.66	2788.16	–132.49	6015.18	6139.13	2603.24	2522.83	–80.41
AVU	784.37	835.31	405.69	400.31	–5.38	982	1030.14	424.99	423.33	–1.66
CZU	50123.73	53785.49	25925.29	25776.1	–149.2	62900.19	65496.23	27221.82	26915.15	–306.67
CVUT	216045.44	235606.37	111744.31	112911.74	1167.43	254619.15	271116.44	110193.55	111413.11	1219.56
JAMU	2211.44	2241.67	1143.81	1074.3	–69.52	2339.91	2367.81	1012.66	973.03	–39.63
JCU	68868.35	75282.8	35620.5	36078.45	457.95	79366.5	85145.02	34348.07	34989.66	641.59
MUNI	196187.43	209251.65	101473.23	100281.53	–1191.7	231206.99	240617.77	100061.28	98879.93	–1181.35
MENDELU	40216.69	44527.72	20801.12	21339.41	538.3	53796.69	56205.7	23282.02	23097.28	–184.74
OUO	27726.77	28607.3	14341	13709.73	–631.27	37005.79	36757.38	16015.29	15105.15	–910.14
SUO	14124.49	14907.25	7305.55	7144.13	–161.42	19198.2	19535.84	8308.56	8028.09	–280.46
TUL	29126.51	31379.32	15064.99	15038.19	–26.8	38296.88	39963.23	16574.05	16422.57	–151.48
UHK	13666.81	14349.25	7068.83	6876.72	–192.11	19431.01	19430.25	8409.31	7984.7	–424.61
UJEP	15790.23	17112.45	8167.12	8200.95	33.83	19707	20935.03	8528.75	8603.08	74.33
UK	517044.06	544457.83	267428.61	260925.37	–6503.24	582779.98	606171.74	252214.32	249101.39	–3112.93
UPAL	142625.7	153671.43	73769.72	73645.33	–124.39	172950.23	182070.76	74849.04	74820.51	–28.54
UPAR	53004.96	63488.89	27415.54	30426.35	3010.8	61086.26	70158.87	26436.79	28831.22	2394.43
UTB	29393.18	32731.75	15202.92	15686.33	483.41	40342.28	43135.66	17459.25	17726.25	267
VFU	18069.32	19244.41	9345.92	9222.67	–123.25	21405.07	22245.7	9263.64	9141.69	–121.95
VSB-TUO	67478.94	72274.03	34901.86	34636.53	–265.33	89736.59	93000.16	38836.01	38217.67	–618.35
VSE	22700.98	23552.58	11741.54	11287.31	–454.22	28887.75	28639.28	12501.98	11769.08	–732.9
VSCHT	72004.54	86497.33	37242.62	41452.88	4210.27	87029.73	100248.11	37664.55	41196.15	3531.6
VSPJ	0	0	0	0	0	262.36	258.05	113.54	106.04	–7.5
VSTE	513	1122.01	265.34	537.71	272.38	1208.26	1259.86	522.91	517.73	–5.18
VSUP	1157.15	1305.81	598.51	625.8	27.29	1503.55	1519.41	650.7	624.39	–26.31
VUT	136456.02	148357.49	70578.6	71098.68	520.08	165400.45	175869.67	71581.67	72272.22	690.56
ZCU	67895.85	71834.92	35117.49	34426.09	–691.41	84368.38	87380.99	36512.78	35908.51	–604.26
Total	**1808862.72**	**1952242.94**	**935590.76**	**935590.76**	**0**	**2161826.38**	**2276698.21**	**935590.76**	**935590.76**	**0**

Research, Development and Innovation Council, 2014 and own calculation

IV: *Relative change of RIV points by re-evaluation, 2007–2011*

Field group		Relative change 2007–2011	Relative change 2008–2011
HUMANITIES	ARTS AND HUMANITIES (SHVa)	1.11	1.1
	HUMANITIES (SHVb)	1.08	1.09
	HUMANITIES (SHVc)		1.08
TECHNICAL SCIENCES		1.28	
TECHNICAL SCIENCES AND INFORMATICS			1.23
MATHEMATICAL SCIENCES AND INFORMATICS		1.01	
MATHEMATICAL SCIENCES			1.01
PHYSICAL SCIENCES		1.17	1.17
CHEMICAL SCIENCES		1.3	1.3
EARTH SCIENCES		1.02	1.03
BIOLOGICAL SCIENCES		1.13	1.12
AGRICULTURAL SCIENCES		1.13	1.13
MEDICAL SCIENCES		0.88	0.88

Table contains only 2008–2011 period, 2012 is in separate Tab. V due to different re-evaluation pattern.
Research, Development and Innovation Council, 2014 and own calculation

V: *Relative change of RIV points by re-evaluation, 2012*

Field group	Type of publication result				
	Jimp	Jneimp	Jrec	Jsc	D
ARTS AND HUMANITIES (SHVa)	1.28	0.96	0.99	0.96	1
HUMANITIES (SHVb)	2.14	0.49	0.71	0.49	0.34
HUMANITIES (SHVc)	1.05	0.67	-	0.67	0.38
TECHNICAL SCIENCES AND INFORMATICS	0.91	-	-	0.83	0.78
MATHEMATICAL SCIENCES	0.95	-	-	0.87	0.35
PHYSICAL SCIENCES	1.53	-	-	-	-
CHEMICAL SCIENCES	1.29	-	-	-	-
EARTH SCIENCES	1.1	-	-	1.07	-
BIOLOGICAL SCIENCES	1.04	-	-	-	-
AGRICULTURAL SCIENCES	1.02	-	-	0.97	1.01
MEDICAL SCIENCES	1.01	-	-	-	-

Research, Development and Innovation Council, 2014 and own calculation

fact that these types are in one group with common percentage limit for chosen disciplines.

Up to the results of 2012 the relative change was the same for all the result types in the same field group. Since 2012, the maximum share of RIV points is stated (Tab. II), causing new information loss.

Tab. VI shows the average initial and final RIV points according to the field group and type of publication result of 2012. The biggest change is in the HUMANITIES (SHVb), after first round the average amount of RIV points for conference proceedings dropped from 8.42 to 2.84. In opposite, the average RIV points for Jimp increased from 25.90 to 55.43.

Tab. V shows the biggest growth of the RIV points in Jimp category. Even if the maximum points of category are exceeded, Jimp points can increase after the re-evaluation due to the points transfers from the other non-reached percentage limits. Contrary, conference proceedings decreased under 40% of the original value in three cases. As a result, articles in proceedings, which have originally 8 points value[2] (Tab. I) (Research, Development and Innovation Council, 2013: 35) drops to less than 3 RIV points after re-evaluation (for example 2.69 for Humanities SHVb).

In the analysis of the RIV points and the related HEIs funding, we should also consider the price of one RIV points. In 2013 MEYS budget, one RIV point was evaluated by 479.23 CZK. Moreover,

2 This conference must satisfy the requirements of the Methodology and must be awarded a non-zero value of the SJR indicator (SCImago Journal Rank).

VI: *Change of RIV points by re-evaluation, 2012*

Field group	Initial RIV points					Final RIV points				
	Jimp	Jneimp	Jrec	Jsc	D	Jimp	Jneimp	Jrec	Jsc	D
ARTS AND HUMANITIES (SHVa)	28.99	13.35	4	23.57	10.73	37.16	12.83	3.97	22.65	10.76
HUMANITIES (SHVb)	25.9	10.94	4.01	30.17	8.42	55.43	5.35	2.85	14.76	2.84
HUMANITIES (SHVc)	25.53	10	0	19.63	8.15	26.78	6.71	0	13.17	3.09
TECHNICAL SCIENCES AND INFORMATICS	38.98	0	0	18.09	15.36	35.4	0	0	15.07	11.91
MATHEMATICAL SCIENCES	41.37	0	0	17.42	15.74	39.1	0	0	15.07	5.54
PHYSICAL SCIENCES	55.31	0	0	14.49	22.19	84.4	0	0	0	0
CHEMICAL SCIENCES	51.44	0	0	20.14	10.16	66.53	0	0	0	0
EARTH SCIENCES	45.1	0	0	18.67	14.16	49.45	0	0	20.06	0
BIOLOGICAL SCIENCES	46.92	10	0	20.05	8	48.93	0	0	0	0
AGRICULTURAL SCIENCES	35.92	0	0	18.8	8	36.73	0	0	18.27	8.1
MEDICAL SCIENCES	39.76	0	0	16.63	8	40.17	0	0	0	0

Research, Development and Innovation Council, 2014 and own calculation

each publication result is counted five times (the evaluation is always given for a sliding 5-year-long period; therefore, each result is counted in 5 consecutive RIV periods). Compare the earnings (include the inflation to get net present value) with a conference fee, travelling and accommodation expenses of the conference, then the conference participation is economically inefficient from purely market point of view.

On the contrary, the conference participation is a significant part of the research process and brings other benefits, such as feedback for the research from other participants, sharing of ideas, basis for future cooperation, etc. It is up to each individual researcher and each HEI where to put the effort and whether or not accept the direct connection between budget and publication results.

DISCUSSION

As we mentioned in the introduction, many authors have recently analysed the publication efficiency of HEIs (or have tried to use research outputs as a tool for funding redistribution). The problem of comparability between different scientific disciplines (Arnold *et al.*, 2011; Jurajda and Münich, 2012), and consequently between departments, faculties or HEIs arises again, as different relative changes occurred among the field groups (see Tab. IV and Tab. V). For example, the approach of the authors Flégl and Vltavská (2014) would not be influenced with the recalculation a lot because these authors analyse only faculties of economics. On the other hand, the proposed approach by Dlouhý (2012) would be influenced significantly due to analyses of different departments. The real impact of the recalculated RIV results can be demonstrated if the both variants of RIV points are applied in these approaches.

All the previously discussed results refer to an information shortage or asymmetry in the evaluation system of research and development in the Czech Republic, which influences the research competition at the Czech higher education system. Researcher's decisions-making process, with regard to publication activity planning, mainly depends on the quality of either a journal or a conference. Then the researcher predicts the publication impact due to the Methodology. Furthermore, the researcher can also predict the impact on the HEI's motivation program. However, the described results show that the reality is in the most cases significantly different. This depends on the impossibility to predict how many publication results will be published in each field group. Therefore, it is not possible to predict the re-evaluation of RIV points in each category.

The Methodology evaluation system tries to provide a tool for measuring publication outputs among different field groups and different publication types. However, both the researchers and HEIs should be aware of the difference between initial explicit part of the Methodology (Tab. I) and

the reality expressed by published final RIV points. Therefore, the financial impact of each publication result should be considered. Taking into account the achieved results: should be or should not be there a direct connection between HEIs' funding from the MEYS budget and publication outputs? The answer is not that simple and requires wide discussion.

Nowadays, a discussion about new methodology begins, and new evaluation system would be launched at the beginning of 2016 (see Ministry of Education, Youth and Sport, 2014a). The main points regarding the new Methodology relate to a Performance-based Research Funding System (PRFS). The evaluation should take account of the differences among research organisations in terms of their "mission in society'. Considering the different missions of research organisations within the research system, the new Methodology needs to take into consideration field specifics (categorisation). Research fields show a high level of heterogeneity in their publication practices. Some fields (especially in the humanities) publish in monographs or books; others (notably the basic sciences) in journals (Mahieu, Arnold, 2015).

As Mutz, Bornmann and Daniel (2013) pointed out "There are not only differences between scientific disciplines in the research output profiles; there is also great heterogeneity of research output profiles within disciplines and segments of disciplines, respectively." Furthermore, there is a desire to identify areas of research excellence and to concentrate resources on these. Bibliometrics and statistical data analyses require a minimum number of data to ensure robustness. However, to the most appropriate and effective way to avoid unintended effects that some indicators may cause, especially in PRFS, is to use a mix of quantitative and qualitative indicators in evaluation (Mahieu, Arnold, 2015).

In addition, it is necessary to mention that HEIs' funding does not depend only on the publication results. In 2014, the funding directly related to the RIV points formed only 5.85% of MEYS budget and most of the HEIs' funding is related to enrolled students (Ministry of Education, Youth and Sport, 2014b).

CONCLUSION

This article provides an insight into the research and development evaluation system in the Czech public higher education system. Authors present an analysis bringing the overall picture of the impact of the Methodology and to support the publication activity decision-making.

Research, Development and Innovation Council defines an approach of assigning the exact amount of RIV points to each publication output. Consequently, each year RIV points from 5-year-long period are converted into the real money from the budget of the Ministry of Education, Youth and Sport. Despite the methodology is fully described and freely accessible, the evaluation process contains rules that lead to an information asymmetry, information shortage or misguiding interpretation.

The evaluation process could be divided into two steps. The first step dwells in initial evaluation of publication results according to the Methodology. The second step consists of the re-evaluation of the publication results to fulfil maximum RIV points stated for field of science and appropriate type of result. The problem consists in the fact that authors of the publications and their managers have only the information from the first step of the evaluation. The final evaluation after the second step is published by Research, Development and Innovation Council after analysis and acceptance of all the results from the particular year, i.e. in some cases more than one year after the publication.

The impact of that issue on HEIs is the topic of this paper. Relative change of the RIV points caused by re-evaluation is presented for two most actual periods. The authors show the change between the Methodology and the final RIV points in terms of the funding. Considering the particular HEIs, Charles University is identified as the most affected by the re-evaluation (mainly due to its position and size). From the relative change point of view the most crucial is the year 2012. In this year, maximum ratio for result type in particular field group is newly stated. This brings significant increase in the re-evaluation gap, where, on the one hand, some conferences drop to 0.35% of their initial value. On the other hand, final RIV points for some papers in journal with impact factor are 2.14 times bigger after re-evaluation.

As a result, a few conclusions could be stated:

- The aim of the paper was to evaluate and quantify the change of publication evaluation according to the Methodology. As we showed, the assigned RIV points differ significantly after the recalculation (Tab. V). Therefore, HEIs' motivation programmes should consider such information, as it seems to be the only way how to trustworthy evaluate publication activity of academics.
- Although the real weight of the papers in journals with the impact factor is much higher after the recalculation, comparing to other publication outputs, the RIV points' source (and consequently money source) lies in different categories. For example, the RIV points for Jimp doubled in the category SHVb. However, this category represents only 21.1% of the total amount (6.7% in the category SHVa).

- If significant amount of HEIs will focus only on highly evaluated categories e.g. Jimp, the recalculation (Tab. V) would result in lower RIV points conversion between categories. Smaller amount in category leads to higher ration of recalculation and vice versa.
- Regarding the new Methodology, the growth of the publication quality should lead to a closer international cooperation. Research is becoming more and more international and the cooperation and collaboration in research is mainly at a global level (membership in the national and global research community). Funding tends to support excellence according to performance indicators.
- Increasing pressure towards Jimp category is the side effect of the overall goal – increase of the quality of R & D. In accordance with Jurajda and Münich (2012) or Mahieu and Arnold (2015) it is expectable that new (more sophisticated) indicators and/or some kind of peer review will be unavoidable part the R & D evaluation in the future. Qualitative evaluation is necessary to prevent gambling, which is common part of the evaluation system based only on simple quantitative indicators.

REFERENCES

ARNOLD, E., GOOD, B., OHLER, F. et al. 2011. *The Quality of Research, Institutional Funding and Research Evaluation in the Czech Republic and abroad, Final Report 3 International Audit of Research, Development & Innovation in the Czech Republic*. [Online]. Available at: http://www.technopolis-group.com/wp-content/uploads/2011/09/1315_CzAudit_FinalRep_3-Quality-of-Research_EM.pdf. [Accessed: 15 August 2014].

DLOUHÝ, M. 2012. Efficiency and resource allocation within a hierarchical organization. *Proceedings of 30th International Conference Mathematical Methods in Economics.* Silesian University, 11–13 September. Karviná: School of Business Administration, Silesian University, 112–116.

FLÉGL, M., TICHÁ, I. and KVASNIČKOVÁ STANISLAVSKÁ, L. 2013 Innovation of doctoral studies at the FEM CULS Prague. *Journal on Efficiency and Responsibility in Education and Science,* 6(4): 265–280. Available at: http://dx.doi.org/10.7160/eriesj.2013.060405.

FLÉGL, M. VLTAVSKÁ, K. 2013. Efficiency at Faculties of Economics in the Czech Public Higher Education Institutions: Two Different Approaches. *International Education Studies*, 6(10): 1–12.

FOLTÝNEK, T., RYBIČKA, J. 2013. Training of academic writing: improving competitiveness of Czech universities. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 61(7): 2111–2115.

JABLONSKÝ, J. 2014. Bibliometric indicators and their comparison on the set of Czech scientists. *Proceedings of 11th International Conference on Efficiency and Responsibility in Education (Erie 2014),* Czech University of Life Sciences Prague, 5–6 June. Prague: Faculty of Economics and Management, Czech University of Life Sciences Prague, 255–261.

JURAJDA, Š., MUNICH, D. *Kde se v ČR dělá nejlepší výzkum?* Studie 3/2012. [Online]. Available at: http://idea.cerge-ei.cz/documents/studie_2012_03.pdf. [Accessed: 2 July 2015].

MAHIEU, B., ARNOLD, E. 2015. *R & D Evaluation Methodology and Funding Principles – Final report 1: The R & D Evaluation Methodology, Technopolis Group*. Available at: http://metodika.reformy-msmt.cz/prvni-dilci-zprava-technopolis. [Accessed: 28 June 2015].

MINISTRY OF EDUCATION, YOUTH AND SPORT. 2013. *Schedule of funding for higher education institutions for the year 2013* [in Czech: *Rozpis rozpočtu vysokých škol na rok 2013*]. [online]. Available at: http://www.msmt.cz/vzdelavani/vysoke-skolstvi/rozpis-rozpoctu-vysokych-skol-na-rok-2013?lang=1. [Accessed: 20 October 2014].

MINISTRY OF EDUCATION, YOUTH AND SPORT. 2014a. *Draft of the First Interim Report*. [online]. Available at: http://metodika.reformy-msmt.cz/prvni-dilci-zprava-technopolis. [Accessed: 13 November 2014].

MINISTRY OF EDUCATION, YOUTH AND SPORT. 2014b. *Schedule of funding for higher education institutions for the year 2014* [in Czech: *Rozpis rozpočtu vysokých škol na rok 2014*]. [online]. Available at: http://www.msmt.cz/vzdelavani/vysoke-skolstvi/rozpis-rozpoctu-vysokych-skol-na-rok-2014. [Accessed: 20 October 2014].

MINISTRY OF EDUCATION, YOUTH AND SPORT. 2014c. *Public higher educations* [in Czech: *Veřejné vysoké školy*]. [online]. Available at: http://www.msmt.cz/vzdelavani/vysoke-skolstvi/verejne-vysoke-skoly-4. [Accessed: 8 October 2014].

MUTZ, R., BORNMANN, L., DANIEL, H-D. 2013. Types of research output profiles: A multilevel latent class analysis of the Austrian Science Fund's final project report data. *Research Evaluation*, 22(2): 118–133. Available at: http://dx.doi.org/10.1093/reseval/rvs038.

RESEARCH, DEVELOPMENT AND INNOVATION COUNCIL. 2006. *Metodika hodnocení výzkumu a vývoje a jejich výsledků v r. 2006*. [Online]. Available at: http://www.vyzkum.cz/FrontClanek.aspx?idsekce=21846. [Accessed: 2 September 2014].

RESEARCH, DEVELOPMENT AND INNOVATION COUNCIL. 2012. *Methodology of Evaluation of Research Organizations and Evaluation of Finished Programmes (valid for years 2010–2012)*. Research, Development and Innovation Council.

RESEARCH, DEVELOPMENT AND INNOVATION COUNCIL. 2013. *Methodology of Evaluation of*

Research Organizations and Evaluation of Finished Programmes (valid for years 2013–2015). [online] Available at: http://www.vyzkum.cz/FrontClanek.aspx?idsekce=695512. [Accessed: 3 August 2014].

RESEARCH, DEVELOPMENT AND INNOVATION COUNCIL. 2014. *Selecting of Results – Data of the R&D IS*. [online]. Available at: http://www.isvav.cz/prepareResultForm.do. [Accessed: 2 September 2014].

SAMUELSON, P. A., NORDHAUS, W. D. 2009. *Economics*. 19th Edition. New York: McGraw-Hill.

SIMON, H. A. 1956. Rational choice and the structure of environment. *Psychological Review*, 63(2): 129–138. Available at: http://dx.doi.org/10.1037/h0042769.

SIMON, H. A. 1991. Bounded Rationality and Organizational Learning. *Organization Science*, 2(1): 125–134. Available at: http://dx.doi.org/10.1287/orsc.2.1.125.

SCHÜLLER, D., CHLEBOVSKÝ, V., DOUBRAVSKÝ, K. and CHALUPSKÝ, V. 2014. The Conceptual Scheme for Managing University Stakeholders' Satisfaction. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 62(4): 719–727. Available at: http://dx.doi.org/10.11118/actaun201462040719.

STOKLASA, J., TALAŠOVÁ, J., HOLEČEK, P. 2011. Academic staff performance evaluation – variants of models. *Acta Polytechnica Hungarica*, 8(3): 91–111.

VLTAVSKÁ, K. and FISCHER, J. 2013. Is It Possible to Estimate Labour Productivity in the Czech Higher Education? *Journal on Efficiency and Responsibility in Education and Science,* 6(1): 34–45. Available at: http://dx.doi.org/10.7160/eriesj.2013.060104.

Contact information

Martin Flégl: martin.flegl@hotmail.com
Igor Krejčí: krejcii@pef.czu.cz
Helena Brožová: brozova@pef.czu.cz