University ranking as a quality of education offer measure

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Introduction

The aim of the present study is to present the possibilities of analysis of education quality at polish universities based on the data related to graduates, in particular, information about the remuneration and experience of unemployment. The data are collected and provided by the Polish Graduate Tracking System (https://ela.nauka.gov.pl/en). The author claims that these data indicate the quality of education and may be used to conduct internal university analyses as well as to draw conclusions for the tertiary education system. It can specially be used in order to make a ranking presenting how well the graduates are prepared to start their career after finalising higher education.

The introduction discusses problems related to the measurement of education quality, the next section refers to the determinants of conclusions based on the data collected in the system and is followed by an example of ranking of institutions of higher education.

The problem of education quality in the tertiary education first appeared in Poland together with the growing popularity of this sort of education in the early 1990s. Due to a growing number of people aspiring to obtain university education, and consequently a rise in the number of education providing institutions, there was a need to create tools to compare these institutions. The candidates and families financing their studies looked for some information directly at universities or in the media to assess and choose the university. Students sought to confirm their right choice, but they also looked, more consciously now than before when they were candidates, for a place to continue studying. And on the part of employers, there was a need to make a preliminary appraisal or preselection of a candidate for the job. University authorities sought to confirm the appropriateness of their performance and to make a comparison with the results achieved by the competitors on the tertiary education market. Such a "demand", formalised to a varying degree, created "supply" in the form of rankings but also gave rise to institutions evaluating the education quality and credibility of new offers. Naturally,

there are also universities which need information about external (objective) appraisal of their performance, as the use of this information in order to improve their didactic offer for the needs of the labour market, the economy and the society is included in their missions and strategies.

The measurement of quality may also give rise to rankings and ratings informing many stakeholders about the results of comparison of data on different kind of tertiary education institutions. A rating or evaluation may constitute a basis for the distribution of financial funds among universities or their units. The measurement of quality is also related to the accreditation perceived as granting educational rights (referred to as the *ex ante* accreditation) as well as the evaluation of education quality (referred to as the *ex post* accreditation). In the systems in which accreditation does not only serve marketing purposes but affects decisions made by the authorities (for example the removal of rights to follow a negative quality appraisal or refusal to grant the rights in the case of a negative opinion of a respective body), the accreditation, or to be more specific its criteria, may have a considerable impact on university management.

Apparently, in practice, the very definition of quality is losing its significance; instead the criteria used by quality appraising institutions are becoming more important[1]. On the other hand, however, it is possible to indicate measures which determine the quality, or at least have an impact on it; for example, the statistical data of activities related to the acquisition of grants from the National Science Centre. It is also possible to indicate measures describing the effects of education, and consequently its quality. The system which monitors careers of university graduates is an important example in this area. And it is this system, or to be more precise, the potential conclusions to be drawn from the data included in it that the present study is devoted to.

The careers of graduates as a source of data

One of the sources of information which may be used in the analysis of university programmes (assumed effects of education) is the Polish Graduate Tracking System (ELA, ELA System). The data included in the reports generated by ELA concern presently, i.e. beginning of the year 2021, the students who graduated in the years 2014-2018. The major source of information comes from the Social Insurance Institution (ZUS) and from the POL-on system[2]. Due to the exogenous character of the data with regard to universities, the conclusions drawn from the analysis may be interpreted differently than in the case of surveys based on questionnaires conducted by universities. It is assumed that data on graduates from each year would be kept for 5 years after the graduation.

The objects of analyses to be conducted on the basis of the data gathered in the ELA system are groups of graduates of a specific field of study who graduated from a selected faculty

at the analysed university. In order to protect personal data, the analyses do not present results of groups of graduates below ten.

The data on university programmes in ELA system are aggregated in such a way that they form joint information on the graduates of a given university.

It should be noted that the Social Insurance Institution (ZUS) register does not include contracts for specific tasks, contracts of mandate, contracts concluded abroad or work without a contract. The data may not include people insured in the Agricultural Social Insurance Fund (KRUS)[3]. What is more, the ZUS data do not include the information on the job done. It is not known then whether or not the undertaken job is compliant with the completed studies. It seems, however, that in the case of the fields of study characterised by the shortest job seeking time or the highest remuneration, it may be assumed that the jobs done by the graduates are compliant with their education (Rocki, 2017).

An important factor which makes the conclusions more credible is the information included in ELA reports about the share of graduates registered in ZUS. This information should have an impact on the choice of specific groups of graduates for comparison.

The system of monitoring economic fates of graduates allows to generate (download) reports on the programmes (the information in this case will be of a given field name) or universities (in this instance the data will relate to all programmes run by particular organizational units of a university), as well as to download tables containing the data[4].

Thus, the data on graduates' careers indicate the effects of education quality and may be used in internal university analyses, in tertiary education market analyses as well as for the proposals for the system of tertiary education. An example of such an analysis will be presented in the next section of the study.

In the context of further analysis it should be underlined that between students of each class in the same year there are de facto differences in field of type of studies (stationary and non-stationary), having or not having a professional experience (before or during studying). Moreover in case of two-cycle studies also because of level of studies (bachelor and master)[5].

It seems obvious that there are different reasons for which people decide to take stationary and non-stationary studies[6]. The reasons to take non-stationary studies can be both combining studies with work as well as no more places available (numerus fixus - due to no more subsidiaries from the State). Moreover studying and working at the same time can have its financial explanation, but also substantive (if it is necessary to get a diploma required by an employer or if there is a will to upgrade qualifications). This diversity has a clear influence on the graduates situation on the labor market.

Apart from the above mentioned example reasons for which candidates decide to take studies of a given type, there is also different methods of recruitment (for instance in public universities it is usually more challenging to become a student of stationary than non-stationary programmes. Apart from that, also possibility to go for practice work or students exchange has also influence on this choice. This from the other hand has also an influence on when students can finalize their studies.

Rankings of universities

From a higher education institution point of view a ranking is an important way of providing information on the situation of individual players on the higher education market as compared against other participants, according to the accepted principles and criteria. Rankings need to be set apart from evaluations, certifications, ratings and accreditations, although these may be used as a basis for rankings or become factors in them.

A ranking, in the light of a popular and widely recognised yet informal definition, is a systematic way of providing information on some objects pursuant to a given criterion or set of criteria. Authors behind the rankings of higher education institutions usually like to highlight that their purpose is to identify an institution which lines up the highest in terms of a particular understanding of quality. Reputation, power of appeal, assets, elites, high quality education, top notch faculty - these are the most frequent characteristics used to describe the winners of such rankings.

It seems that the goals of all of those who conduct evaluations, ratings, accreditations and rankings of universities remain similar. The most frequently and explicitly quoted role of evaluations, accreditations and rankings of educational institutions is enhancing the actions leading to increased quality in education processes. This has become, not only in Poland, a consequence of the pervading mass education and rise of the education market. Public relations become of paramount importance to any university. The ongoing demographic and potential changes, as well as the implementation of corresponding legislative regulations mean that the value of the image and brand are vital for the survival and success of any educational institution.

The purpose of rankings is to collect, verify and pool the data (various types of information), as well as to process and announce them to the wide public. Authors of these rankings often mention university candidates and their parents as the most interested parties, but actually keen recipients of ranking data are found also among employers and the educational institutions themselves. For candidates and their families rankings are a source of information about how the universities, their units and the offered curricula are positioned against other entities of the same type. Occasionally, rankings can inform on what the odds of admission to

a particular institution are. For employers the results of a ranking may provide a premise for searching potential employees. For university bodies, in turn, ranking results provide information on the perceived strengths and weaknesses of the institution, and thus may become a quality improvement tool. The significance of rankings and their popularity gave rise to the establishment of a new code of good practice in this field (Barron, 2006).

Generally, the starting point for creating a ranking is defining the criteria, the ways of measuring them and the methods of calculation, allowing to arrive at a particular sequence of objects involved in the ranking (Guarino, 2005, Merisotis, Sadlak, 2005, Liu, Cheng, 2005). Farther on in the paper the source of data and the resulting criterion will be presented, formally speaking: a meta-criterion structured as a function using several criteria.

Data used for the ranking

A source of data for the proposed ranking is ELA System - the nationwide system of monitoring economic fates of graduates.

The data included in the analyses were of the graduates of the second cycle programmes and long cycle Master programmes of the year 2018 of various universities because the majority of graduates of first cycle programmes (63%, see: Zając et al., 2018, pp. 194) continue education. In the group of graduates defined according to these criteria, 266 groups of graduates of the second cycle programmes (12914 people in total, and 121840 registered in ZUS) and 72 groups of the long cycle Master programmes (19840 people, 17960 in ZUS) were studied[7]. The data adopted for analysis (aggregated at the university level) do not allow for identification of graduates from various modes of study. As a result, the fates of both full-time and part-time programmes graduates have been described jointly[8].

The proposed ranking criterion

The purpose of ranking higher education institutions is to appoint "the best" one. In most cases ranking authors will be searching a set of factors which, when combined in an aggregate function, can produce the right sequence of the studied institutions. If we assume that "the best" university is the one that offers the highest quality education, we should be looking for a set of factors able to define this quality. The quality of university programmes results from the composition, engagement and competencies of the academic faculty, the quality and scope of the research conducted, the comprehensiveness, quality, structure and style of delivery of the curricula, the university infrastructure, the functioning of the study support systems as well as the efficiency of the internal quality ensuring system. All of them combined constitute a set of variables which in soft modelling (Wold, 1980) are known as the forming indicators. On the other hand, there are also reflecting indicators which define the effects of the

programme "quality". These are the data pooled in ELA system such as the average time spent seeking the first job, average number of months during which graduates were registered as unemployed, share of unemployed graduates, average monthly wages etc. However, the synthetic characteristics determining graduate fates on the job market in ELA system are:

WWB - relative unemployment index, calculated in such a way that an individual unemployment risk proportion to the average registered unemployment in the district of abode (or districts if the place of abode has been changed) is established for individual graduates in the time period of the study. The value of the index presented in ELA reports amounts to an average of these proportions. Unemployment risk in ELA system has been defined as an average percentage of the number of months after the month of obtaining a degree during which graduates remained registered as unemployed;

WWZ - relative wage index, calculated by establishing for each graduate a proportion of his average wages to average wages in the district (districts) of abode in the time period of the study. The value of the index included in ELA report equals the average of these proportions.

WWB and WWZ in a synthetic manner characterize the fates of graduates as they, irrelevant of the field, profile or mode of study and the profession pursued after obtaining a degree, indicate graduates' preparedness to compete on the job market and, on the other hand, express the market valuation put on graduates by employers. Graduates' successes on the job market in terms of short time of searching a job after obtaining a degree and high wages stem from the fact that the university offers and delivers university programmes meeting the needs of the society and the economy. Indirectly, it also implies that the university is able to efficiently cooperate with employers on improving study programmes and conduct scientific research conducive to such improvement. It may thus be assumed that WWB and WWZ synthetically characterise the quality of university activity and can be used as criterion components in the ranking.

According to the definitions:

- WWB is more valuable when it is closer to zero, the values below 1 signify that the unemployment risk of a given university graduates is lower than average. A zero value of WWB means that none of the graduates in the study period registered as unemployed. The construction and definition of WWB implies that this index is an inhibitor. Converting it into a stimulus meant modifying its value:

$$\text{modyfWWB}_i = \text{WWB}_{max} - \text{WWB}_i$$

where modyfWWB$_i$ – is a modified value of the relative unemployment index for a given i-university, WWB$_i$ – is the original value of the index, WWB$_{max}$ – is a maximum value of the index in the set of the analysed universities;

- WWZ is the more valuable, the higher it gets, so it is a stimulus. Values higher than 1 signify that the wages of a given university graduates are higher than average.

Preliminary idea of the ranking used the multiplication of WWZ and modified WWB, however data analysis shows that less numerous graduate groups can find their first jobs relatively faster. For this reason it was proposed to correct the multiplication with a logarithm of the number of graduates registered in ZUS[9].

Thus, the meta-criterion of the ranking is a feature defined as a multiplication:

$$K_i = WWZ_i * modyfWWB_i * \ln(N_i * ZUS_i)$$

where N$_i$ – is the number of graduates of a given cycle of a given university, ZUS$_i$ – is the share of graduates of this cycle of a given university registered in ZUS.

Results

This part of the article will present fundamental results of the ranking for long cycle Master programmes and second cycle programmes[10].

Two rankings will be presented separately for public[11] and private institutions accordingly both to the comment which can be found in note 6 refering to differences in rules of acting of public and not public universities in Poland and also analysis presented in Zając, Jasiński, Bożykowski (2018).

The graph presented on the Picture 1 metacriteria values for public universities are presented on the left and private universities on the right.
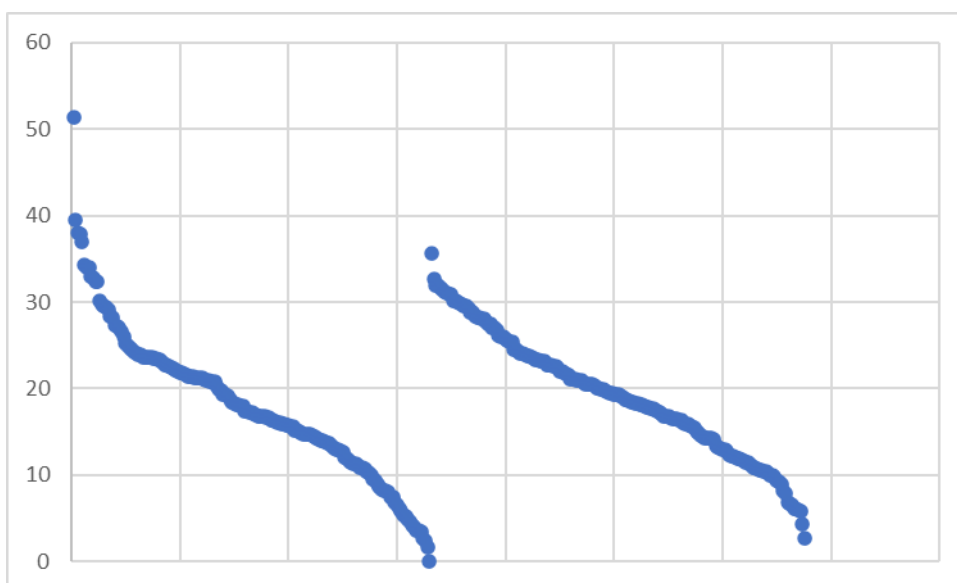
Picture 1. Metacriteria values for both types of Universities

Source: data from ELA system and own calculations

In the tables: N – stands for the number of graduates, PwZUS – for a fraction of graduates who registered in ZUS in %, WWB – the value of a relative unemployment index, WWZ – the value of a relative wage index, being the data from the ELA system.

Table 1 is presenting order of public universities which results from above mentioned metacriteria. It consists of data regarding 30 from167 public universities with highest metacriteria values. Apart from one case (point 25) it all regards second cycle program.

Technical and economic universities appear dominant among top universities offering second cycle programmes. In the top 30 universities, there are 12 technical universities (including military and fire service), and all five public economic universities. Classic multi faculties universities are practically only in third tenth of the presented ranking. It could be concluded that more specialized universities, such as technical and economical are better responding needs of labor market when it comes to graduates.

It its worth mentioning that in the top of the presented ranking there is only one university which offers long cycle program: 25th place Medical University of Lodz.

What is characteristic for labour market for graduates of universities from the last places there are church and fine arts institutions as well as universities offering long cycle.

Table 1. 30 top universities in the public university ranking[12]

No.	Name	N	PwZUS	WWB	WWZ
1	SGH Warsaw School of Economics	1693	95,04%	0,27	1,3
2	Warsaw University of Technology	2883	93,24%	0,51	0,98
3	AGH University of Science and Technology	3484	94,72%	0,83	0,98
4	Wrocław University of Science and Technology	3229	94,70%	0,7	0,96
5	Poznan University of Technology	2291	95,90%	0,76	0,99
6	Police Academy in Szczytno	489	98,98%	0,48	1,08
7	Gdańsk University of Technology	1996	93,44%	0,76	0,93
8	Wrocław University of Economics	1587	96,47%	0,74	0,95
9	Cracow University of Economics	2735	93,09%	0,78	0,87
10	Lodz University of Technology	1439	95,41%	0,79	0,94
11	University of Warsaw	4079	91,74%	0,63	0,79
12	Silesian University of Technology	2501	97,28%	0,91	0,88
13	Warsaw University of Life Sciences – SGGW	2022	94,71%	0,7	0,81
14	Poznań University of Economics and Business	1520	96,18%	0,65	0,82
15	Main School of Fire Service	219	99,09%	0,48	1,07
16	Medical University of Warsaw (second cycle)	635	98,11%	0,32	0,86
17	Military University of Technology	640	97,03%	0,65	0,91

18	Cracow University of Technology	2211	95,75%	1,1	0,82
19	Jagiellonian University	3208	89,18%	0,95	0,76
20	Cracow University of Economics	1331	97,22%	0,79	0,79
21	University of Applied Sciences in Nysa	38	100,00%	0	1,33
22	University of Lodz	3349	95,85%	0,97	0,72
23	University of Science and Technology in Bydgoszcz	605	96,36%	0,87	0,88
24	University of Gdansk	2689	95,76%	0,88	0,7
25	Medical Universit of Lodz (long cycle)	798	92,73%	0,16	0,7
26	Adam Mickiewicz University	3094	94,83%	1,02	0,68
27	Nicolaus Copernicus University	2117	95,80%	0,87	0,67
28	Medical University of Poznan (second cycle)	578	97,75%	0,57	0,75
29	West Pomeranian University of Technology	827	95,65%	1,03	0,78
30	University of Zielona Gora	964	96,58%	0,97	0,75

Source: data from ELA system and own calculations

It should be noted that among the universities listed in table 1, the graduates of only four of them have had earnings higher than the average of their districts of abode within the first year after graduation. At the same time in few cases it was more risky for the graduates to suffer from unemployment than it is pointed out in average data for their place of living.

Because in many cases public institutions (especially all classic universities) are offering both second and long cycle, they appear in the ranking in two positions (for example University of Warsaw is 11th with second cycle and 47th with long cycle and Jagiellonian University on 19th and 43rd).

Analysis of the ranking results is pointing out that employers value more absolvents of second cycle as it is easier for the institutions to apply changes to better address the labor market needs. At the same time a significant part of students of second cycle are already alumni of another faculty (also on another university). This may lead to a conclusion that employers prefer graduates with better experience and wider horizons.

It is worth mentioning that in the first third of the ranking there are both institutions with very small number of alumni (38 people from University of Applied Sciences in Nysa, which within second cycle offers architecture and nurse studies) as well as the biggest Polish universities (University of Warsaw with 4079 second cycle alumni and 878 long cycle alumni or Jagiellonian University with 3208 graduates from second cycle and from 1434 long cycle. It should be added that alumni of the second cycle conducted by medical universities are on better positions after the first year on the labor market than long cycle alumni. This is however a result of system in which medical doctors are employed. For alumni three years after getting the diploma the situation is different as it was described in Rocki (2019).

In the top of the ranking of private institutions [13] there are also universties offering second cycle. Among first 30 institutions there is only SWPS University (18th place) conducting long cycle program on two faculties: law and psychology.

Table 2 is presenting order of private universities. It consists of data regarding 30 from171 private universities with highest metacriteria values.

It should be mentioned that in case of private universities it is often difficult to define their profile, as they conduct few different faculties (for example finance and nurse studies). For this reason in analysis we cannot take into consideration only names of the institutions. For instance a medical university are Higher School of Strategic Planning in Dąbrowa Górnicza and Collegium Masoviense. Third in ranking Wyższa Szkoła Biznesu i Przedsiębiorczości is offering economy and pedagogy but also nurse program.

Table 2. 30 top universities in the private university ranking

No.	Name	N	PwZUS	WWB	WWZ
1	Higher School of Strategic Planning in Dąbrowa Górnicza	175	98,31%	0,09	1,25
2	Collegium Masoviense	154	98,72%	0,07	1,17
3	Wyższa Szkoła Biznesu i Przedsiębiorczości w Ostrowcu Świętokrzyskim	261	98,49%	0,3	1,08
4	University of Information Technology and Management in Warsaw	111	96,52%	0,61	1,35
5	Elbląg University of Humanities and Economics	293	98,65%	0,16	1,02
6	Kozminsky University	368	71,73%	0,28	1
7	WSB University Poznań (Wyższa Szkoła Bankowa)	1120	97,99%	0,58	0,88
8	WSB University Wrocław (Wższa Szkoła bankowa)	1321	95,31%	0,71	0,88
9	University of Humanities and Ecomics in Lodz	458	93,66%	0,42	0,97
10	Wyższa Szkoła Umiejętności Społecznych w Poznaniu	141	99,30%	0	1,11
11	University of Medical Sciences in Legnica	107	99,07%	0	1,15
12	Polonia University	74	83,15%	0,01	1,25
13	Wyższa Szkoła Nauk Stosowanych w Rudzie Śląskiej	27	100,00%	0	1,62
14	University of Social Sciences	1652	93,65%	0,65	0,81
15	Lipinski University	359	98,90%	0,61	1,01
16	Poznan School of Logistics	381	98,45%	0,43	0,96
17	Enviromental Management University in Tuchola	25	100,00%	0,22	1,7
18	SWPS University	1199	95,84%	1,03	0,9
19	WSB University Torun (Wyższa Szkoła Bankowa)	620	98,73%	0,58	0,89
20	WSB University Gdańsk (Wyższa Szkoła Bankowa)	748	97,91%	0,45	0,84
21	Helena Chodkowska University of Technology and Economics	448	95,12%	0,47	0,9
22	Lazarski University	166	72,49%	0,4	1,06
23	University of Economics and Human Sciences in Warsaw	281	73,95%	0,36	0,95
24	WSB University (Wższa Szkoła Biznesu)	527	93,61%	0,53	0,88
25	Cuiavian University in Wloclawek	210	99,06%	0,38	1

26	University of Economics and Innovation	651	95,74%	0,76	0,88
27	University of Business in Wroclaw	57	86,36%	0,18	1,25
28	Wyższa Szkoła Informatyki Stosowanej i Zarządzania w Warszawie	77	90,59%	0,72	1,29
29	Wyższa Szkoła Gospodarki Krajowej w Kutnie	97	97,00%	0,38	1,13
30	Warsaw School of Computer Science	29	100,00%	0	1,43

Source: data from ELA system and own calculations

Beside previous comment, it can be noted that in case of top of the ranking there are the universities offering medical and economical programs.

It can be observed that in case of alumni of private institutions more often than alumni of public institutions get higher renumerations than average in their place of living (indicator of WWZ value higher than 1). This is connected with the fact that in majority of cases students of those universities are working and studying.

In comparison with public universities (despite those which are presented in the table) have less alumni. For 30 universities with the lowest values of metacriteria only 4 have more than 100 alumni and in majority of cases offer long term cycle.

For the end of the presentation of the ranking result it is worth to note that in the first thirty institutions only Jagiellonian University has less than 90% of alumni registered in ZUS (89,18%). In case of private universities it is less than 90% (but not less than 70%). That is because there are students from other countries who after graduation go back to their home countries[14].

Conclusions

It is noteworthy that applying a metacriterion and exogenous data makes the results certainly more objective. Many popular rankings use data from surveys carried out by universities which are difficult to verify, but using specific features in rankings encourages quality improvements in particular measures (values of forming indicators) in order to attain a better ranking position. In the proposed ranking, synthetic and holistic characteristics which define the effects of the university activity have been accounted for, so attaining a higher position in the ranking will be a potential effect of multiple improvement processes relating to these activities.

In particular the proposed ranking is indicating a possibility to measure quality of education. This can be done by monitoring the alumni on the labor market on the basis of data from ZUS which was a goal of this study. It should be underlined, that presented ranking is objective only considering the proposed criterium. The results can be however a starting point to conduct further, deeper analysis.

Certainly, the conclusions from the ELA reports are not and cannot be the only basis to formulate opinions on the quality of education. It is worth comparing them with inspection reports and education quality assessment made by Polish Accreditation Commission (PKA)[15] as these reports include extensive information about teaching staff, infrastructure or international cooperation. Consequently, such an analysis may give rise to corrections, improvement or liquidation of the field of study, which was not positively perceived by employers. These analyses may be particularly interesting due to the comparison of the graduates' careers with the declarations of universities on the cooperation with employers in the course of creation of a study programme for an atypical field of study.

To recap, the presented results of calculations seem to indicate that the job market has a higher appreciation of graduates in technical and economic programmes than of those in "general university" or "life sciences" fields. However, it should be kept in mind that technical and economic programmes are also run at classical universities (practically also other types of universities), but it is actually the graduates of the universities whose key mission is "reflected" in their name, that offer programmes which are highly valued by the labour market. At such universities, when they strive to deliver on their mission, scientific research may be better applied to improve academic curricula due to the natural synergy of both processes. A wide scope of scientific research correlated with real economic processes helps refine academic curricula. This kind of research usually arises from intense and efficient collaboration with the social and economic environment, which consequently impacts on the creation of the curricula. All of this increases the quality of tuition and attracts recognition of the job market.

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[1] For instance in so called Shanghai ranking (ARWU) quality of education is measured taking into account only the number of Nobel prices winners among the graduates (Liu Nian Cai, Cheng Ying, 2007).

[2] POL-on is an integrated system (a repository) of data on the Polish tertiary education gathering data on universities, including data on the students and staff: https://www.polon.nauka.gov.pl/siec-polon

[3] KRUS – the Agricultural Social Insurance Fund: an alternative system of social insurance for farmers: https://www.krus.gov.pl/en/

[4] For communities of fewer than 10 persons reports are not generated, and for sub-sets of fewer than 3 persons the numerical data are not presented.

[5] In the ELA system there are three "levels" ("cycles") of studies: first cycle, second cycles and long cycle studies.

[6] Comment for readers from other countries than Poland: in Polish public universities not more that half of students can pay their fee. The basic activities of those universities is financed by

the State budget. In private universities as a rule all of the students are paying the fee. Most of the time students who pay the fee are working and the universities are organizing the lectures during weekends – this type of studies are called)non-stationary (part – time). Studies that take place during the week days are called stationary studies (full time). The minister responsible for higher education is deciding which faculties are organized as long cycle master's degree.

At the moment those faculties are: medical analysis, pharmacy, physiotherapy, medical, dental, preschool education, basic and special education, law, veterinary. Psychology, theology and artistic faculties can be organized long cycle master's degree.

For all other faculties division for stationary studies (full time) and non-stationary (part time) applies. Due to above mentioned differences in financing of studies, are a reason why students preferably go for stationary studies on public universities. This from the other hand cause that there are more students that places available and as a result of that only the best candidates are accepted. This is why private universities have less candidates that places they can offer. There is no need to have any recruitment process and usually it is enough to just register for studies and pay the fee.

[7] The year group of 2018 represents jointly: 324542 people.

[8] According to studies (Rocki, 2018, 2020) graduates of part-time programmes occupy a relatively more advantageous position on the job market as they usually continue working while studying. It particularly may be true for non-public universities where part-time programmes prevail. For the same reason, joint study of both part-time and full-time graduates affects (overstates) the presented results of non-public universities.

[9] Applying the logarithm is in line with the Weber-Fechner law (Mourao, 2012): at universities the impact of the number of students on the quality of studying is lower for high numbers of people studying. Practically, the result of the ranking is not closely correlated with the number of students, although the number of students does affect the market situation of graduates of a given university.

[10] In Rocki (2019) there are results of ranking for class 2014 presented. They were based on data about labor market for graduates three years after graduation.

[11] Church universities are financed on the same conditions as public ones (but on different legal basis) therefore they were taken into account as public ones also (Duda, 2012)

[12] In the table there are English names from University web site.

[13] If there is no English name on the University web site, a Polish name is used.

[14] As an example: in Kozminski University 28,27% graduates are not registered in ZUS. According to data from http://www.studyinpoland.pl/en/ in 2017 between 65793 students from abroad there was 35584 from Ukraine and 5119 from Belarus (together 61,87%).

[15] https://www.pka.edu.pl/en/home-page/, as well as: https://www.pka.edu.pl/en/database-of-the-assessed-higher-education-institutions-units-and-programmes/