APPLICATION OF THE MALMQUIST PRODUCTIVITY INDEX TO EXAMINE CHANGES IN THE EFFICIENCY OF HUMANITIES FACULTIES

Piotr Pietrzak, Joanna Baran[✉]

Warsaw University of Life Sciences – SGGW

ABSTRACT

The aim of this study was to determine changes in efficiency of humanities faculties using the Malmquist Productivity Index (MPI). The analysis included 14 university organisational units supervised by the Minister of Science and Higher Education, for which relevant data were available. In the period from 2008/2009 to 2014/2015, the average Malmquist index value was 28%, indicative of increased faculty productivity. Changes in technology growth did not affect the index figure, as their average in the analysed period was around 1. Changes in technical efficiency, which amounted to 34% per year on average, were the main factor driving increased productivity of faculties.

Key words: higher education, efficiency, Malmquist productivity index

INTRODUCTION

The public higher education sector in Poland is facing important challenges. One of them is the steadily decreasing level of financing, and another – the shrinking student population [Świtłyk and Wilczyński 2015]. As forecast by the Ministry of Science and Higher Education, continued demographic decline will cause the number of students to decrease to around 1.25 million in 2023–2025 [*Szkolnictwo wyższe w Polsce* 2013]. Both challenges will force universities to undergo organisational changes. Many of them will be compelled to terminate or suspend study programmes. This results not just from legal provisions that set out minimum enrolments in higher education institutions and the number of students in teaching groups, but also from pure financial calculations [Pietrzak 2016]. Moreover, the importance of measuring the efficiency of universities and their faculties will continue to grow.

Attempts to measure this efficiency raise doubts. This is mainly the result of the specific character of higher education, and especially the fact that academic activities revolve mostly around non-material values and are undertaken by various groups of stakeholders with different opinions on the purpose and role of universities. Finally, the "knowledge manufacturing" process and especially its effects are not easy to measure.

It should be added that studies on application of the Malmquist index to analysing the changes of university efficiency are rare in Polish scientific literature. Research on this topic has been conducted by, among others, Ćwiąkała-Małys [2010], Świtłyk and Wilczyński [2015], and Pietrzak [2016]. The reluctance of researchers to tackle this issue is the result of, among others, the lack of comparable data (both quantitative and qualitative). Statistics concerning the results of universities and their faculties in teaching, scientific or implementation

[✉]joanna_baran@sggw.pl

activities are difficult to obtain. Collecting them often requires getting directly in touch with those in charge of academic units and, in many cases, browsing through statistical data available only in hardcopy.

The aim of the studies was to define the changes in efficiency of humanities faculties from 2008/2009 to 2014/2015. The studies covered faculties of universities supervised by the Minister of Science and Higher Education, for which suitable data from the academic years 2008/2009, 2011/2012 and 2014/2015 was available. In the studies, the authors planned to verify the following research hypotheses:

• H1: From 2008 to 2015, the productivity of humanities faculties has increased.
• H2: Changes in technical efficiency (EFCH) were the main factor driving increased productivity of humanities faculties between 2008 and 2015.

LITERATURE REVIEW

Public universities undergo transformation because of problems with financing, competition from alternative educational institutions, the mass character of higher education, or bureaucratisation [Sułkowski 2016] "No longer scientific and cultural-making institutions (...) [they] are clearly turning into enterprising or even »industrial« universities. Traditional academic values are displaced by market rules" [Czerepaniak-Walczak 2013]. Hence, a university's activities are increasingly being described in business terminology. Notions such as "production of knowledge", "supply of educational services", "educational services market" or indeed "efficiency of higher education processes" are widespread. It is the last of these that the authors decided to focus their research attention on.

Defining the efficiency of higher education institutions and efficiency in general is a non-trivial task. As stressed by Kozuń-Cieślak [2013a], there is a broad range within which this notion may be understood and interpreted. Even though efficiency is commonly used by economists, financial analysts, engineers, managers and politicians, its semantic value is unclear [Kozuń-Cieślak 2013b]. A good reference point for solving definition problems is praxeology [Kulawik 2010]. According to commonly accepted ideas in this field, efficiency has both a narrow and a broad meaning. In the broad meaning, efficiency consists of effectiveness, profitability and economy (productivity). On the other hand, efficiency is more narrowly equated with economy (productivity)[1], understood as the ratio of achieved effects (outputs) to sustained expenditures (inputs) [Kulawik 2010]. This narrow meaning of efficiency was also used by Penc [1997], Jóźwiak [1998], or Bórawski and Pawlewicz [2006]. Therefore, speaking about the efficiency of universities the authors have in mind the relationship between effects achieved by these institutions as regards their teaching, scientific and enterprising activities[2] and the material, financial and especially human expenditures they have sustained. It should be noted that in this definition the authors paid tribute to neoclassical economy and its assumption that enterprises (and consequently universities) are "black boxes". As stressed by Szuwarzyński, "as a result of the complexity of their processes, universities must be viewed as multi-input and multi-output units". In many cases, these inputs and outputs are not measurable, nor is using economic criteria in the decision process always possible [Szuwarzyński 2006].

Research on the efficiency of universities has usually been conducted within a single country only. This is because no universal higher education system exists and the features of universities in each country vary [Wolszczak-Derlacz 2013]. So far, the subject of analyses were universities and their faculties in countries, such as: Australia [Mamun and Rahman 2016], China [Hu and Liang 2008], Spain [Agasisti and Pérez-Es-

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[1] In this article, the notions of efficiency and productivity will be used interchangeably.

[2] These three kinds of activities are the foundations on which the mission of a third generation (enterprising) university rests.

parrells 2010], Japan [Kaneko 1997], South Africa [Taylor and Harris 2004], Turkey [Bayraktar et al. 2013], the UK [Glass et al. 2006] or Italy [Agasisti and Ricca 2016]. In Poland, measurements of university efficiency have, to the best of the authors' knowledge, originated with Szuwarzyński [2006]. Nevertheless, his study was "strictly illustrative" in nature and its main limitation was the modest range of empirical material available (just one university and its eight faculties). In recent years, increased interest in this topic can be observed in Poland, undoubtedly consequent upon the situation of the higher education sector, its financial standing and efforts to reform this area of public life [Wolszczak-Derlacz 2013]. Articles discussing the issue of measuring the efficiency of academic centres have been written, among others, at the Gdańsk University of Technology, Bialystok University of Technology, West Pomeranian University of Technology in Szczecin, University of Wroclaw, Jagiellonian University, or the Warsaw University of Life Sciences – SGGW. Continued research on the efficiency of universities is of course recommended. In this respect, it pays to operate on as large and varied research samples as possible – so far, only a few studies have been conducted on faculty level [Pietrzak 2016]. It must, however, be stressed that the task is difficult, as already noted in the introduction.

RESEARCH METHOD AND MATERIALS

The majority of previous research concerning the measurement of efficiency of higher education institutions made universities the basic unit for analysis. However, universities are made up of many faculties. This is similar to business organizations where large corporations typically consist of many independent divisions (branches) treated as *strategic business units* (SBU). Therefore, in the opinion of the authors, when measuring the efficiency of universities, the unit for analysis should be a faculty and not the academic organisation as a whole.

Based on this assumption, the study included faculties where humanities are taught. According to the OECD classification, these include, among others, history, archaeology, languages, literature, philosophy, ethics, religion and art [Pietrzak 2016]. Currently, public universities in Poland run almost 120 faculties of this kind, however, comparable data is available only for 14 of them. The necessary statistical information has been derived from the "Rector Reports on University Activities" published in Public Information Bulletins.

The choice of the period from 2008/2009 to 2013/2014 as the study scope was dictated by the availability of data. Prior to 2008/2009, only a few universities published reports citing the number of students, number of publications or number of pursued research topics. On the other hand, when the study commenced, the most current data was from 2014/2015.

In order to determine changes in efficiency of humanities faculties in time, the *Malmquist Productivity Index* (MPI)[3] was used. The index structure is based on comparing the relationships between several inputs and several outputs of the same subject at various points of time [Baran 2014]. The Malmquist Productivity Index for a subject is the product of the Technical Efficiency Change Index[4] (EFCH) and the Technology Growth Change Index[5] (TECH) according to the following formula [Färe et al. 1994].

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[3] MPI is the index used most frequently to quantify changes in efficiency [Świtłyk and Wilczyński 2015].

[4] Technical efficiency is defined as the relationship between output obtained with specific inputs to maximum possible outputs which could be obtained with those inputs.

[5] Technology growth is defined as changes in manufacturing technology in the studied period. In case of universities, this will be for example the popularisation of e-learning platforms in teaching activities.

$$M(y_{t+1},\ x_{t+1},\ y_t, x_t)\ =\ \underbrace{\frac{D^t(y_{t+1},\ x_{t+1})}{D^t(y_t,\ x_t)}}_{EFCH^{\,t+1}}x\ \underbrace{\left[\frac{D^t(y_{t+1},\ x_{t+1})}{D^{t+1}(y_{t+1},\ x_{t+1})}\ x\ \frac{D^t(y_t,\ x_t)}{D^{t+1}(y_t,\ x_t)}\right]}_{TECH^{\,t+1}}^{\frac{1}{2}} \tag{1}$$

where: $D^t\left(y_{t+1},\ x_{t+1}\right)$ – efficiency when using technology of year t for data from year $t + 1$;

$\quad\quad D^t\left(y_t,\ x_t\right)$ – the unit's efficiency in period t while using the then available technology and for data from period t;

$\quad D^{t+1}\left(y_{t+1},\ x_{t+1}\right)$ – the unit's efficiency in period $t + 1$;

$\quad D^{t+1}\left(y_t,\ x_t\right)$ – efficiency while using the technology of year $t + 1$ for data from year t.

When the Malmquist Productivity Index value is larger than 1, it is assumed that there was a productivity increase in the period from t to $t + 1$. On the other hand, when the index value is smaller than 1, this means that productivity decreased, while the value of 1 means that efficiency remained unchanged. EFCH and TECH values are similarly interpreted [Coelli et al. 2005].

The Malmquist Productivity Index for subject P has been illustrated in Figure 1 and can be decomposed as follows [Cooper et al. 2007]:

$$EFCH\ (P)\ =\ \frac{\dfrac{BD}{BP_2}}{\dfrac{AC}{AP_1}}, \quad\quad TECH\ =\ \sqrt{\frac{AC}{AE}\cdot\frac{BF}{BD}}$$

and thus $MPI\ =\ \dfrac{AP_1}{BP_2}\sqrt{\dfrac{BF}{AC}\cdot\dfrac{BD}{AE}}$
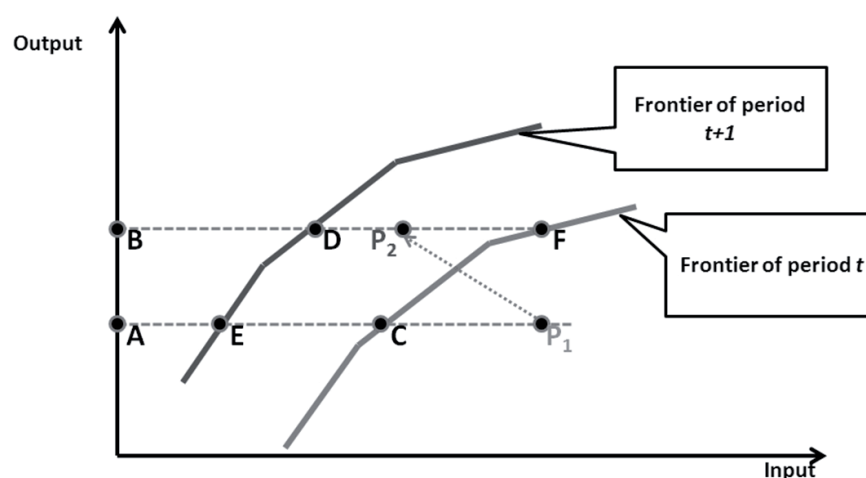

Fig. 1.   Illustration of the Malmquist Productivity Index

Source: Cooper et al. [2007].

RESULTS OF RESEARCH

To determine changes of efficiency in time for humanities faculties, the output-oriented MPI was used as strategies of the studied faculties focus more frequently on making academic teachers more active than reducing the headcount. The following diagnostic values have been used in the calculated model:

1) output y_1 – showing how active are the faculties in teaching processes (number of students),
2) output y_2 – showing the academic activity represented by the number of publications of faculty members (number of publications);
3) output y_3 – showing the initiative of faculties in obtaining external funds in the form of grants and research conducted by faculty members using university resources, also called KZL (number of research projects);
4) input x_1 – number of academic teachers.

The selection of variables for the study has been based on substantive criteria, taking into account literature concerning studies on university efficiency (Table 1), as well as their availability.

Table 1. List of selected empirical studies justifying the selection of diagnostic variables

Diagnostic variable		Empirical study
Input x_1	number of academic teachers[a]	• Ćwiąkała-Małys [2010] • Kounetas et al. [2011] • Worthington and Lee [2008]
Output y_1	number of students	• Abbot and Doucouliagos [2003] • Carrington et al. [2005] • Ćwiąkała-Małys [2010]
Output y_2	number of publications	• Johnes and Johnes [1995] • Leitner et al. [2007] • Wolszczak-Derlacz [2015] • Worthington and Lee [2008]
Output y_3	number of research projects	• Agasisti and Johnes [2009] • Worthington and Lee [2008]

[a] The table relies on the number of academic teachers due to the lack of uniform standards in the manner of conferring academic degrees and appointing teachers to professorship. Each country has its own traditions in this respect.

Source: Own study.

First, it has been assumed that the selected output represents three foundations on which an enterprising university's mission rests (of course only to the extent allowed by the limited availability of data). Second, due to the small number of studied subjects (14 faculties), the number of diagnostic variables could not have been too high. Assuming three variables on the output side, the authors were forced to select only one variable on the input side[6]. With this limitation in mind, it was decided that the key input is people, especially academic staff.

The average annual increase of productivity measured using MPI for all faculties in the studied period was 28% (Fig. 2). Therefore, hypothesis 1, that productivity of humanities faculties has increased from 2008 to 2015, has been confirmed.

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[6] The total number of inputs and outputs should be three times less than the number of study subjects.

It should be stressed, however, that from 2008/2009 to 2011/2012 the observed MPI level was decidedly higher at 1.53, while in the subsequent three years from 2011/2012 to 2014/2015 it was merely 1.02 (Fig. 2). The decrease of the Malmquist Productivity Index (MPI) level was mainly driven by changes in the technology used. The average annual Technology Growth Change Index (TECH) in the studied period from 2008/2009 to 2014/2015 was around 1, it should be noted however that its level has decreased from 1.15 to 0.84 between the first period and the next (Fig. 2). On the other hand, the average annual index of technical efficiency changes (EFCH) in the studied period was on a similar level and amounted to 34%.

Therefore, hypothesis 2, i.e. changes in technical efficiency (EFCH) being the main factor driving increased productivity of humanities faculties from 2008 to 2015, has also been confirmed.
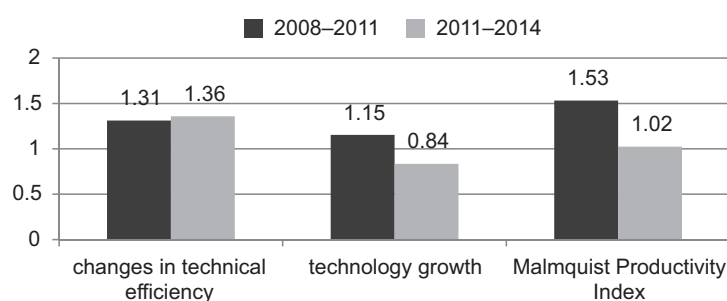

Fig. 2. Malmquist Productivity Index, changes in technical efficiency, technology growth for humanities faculties
Source: Own study.

By analysing the average MPI for particular humanities faculties, it must be considered that 8 out of 14 studied units improved their productivity on an average annual basis. The highest average annual increase of productivity has been noted at the Faculty of Arts of the Silesian University and the Faculty of *Artes Liberales* of the Warsaw University (Fig. 3).
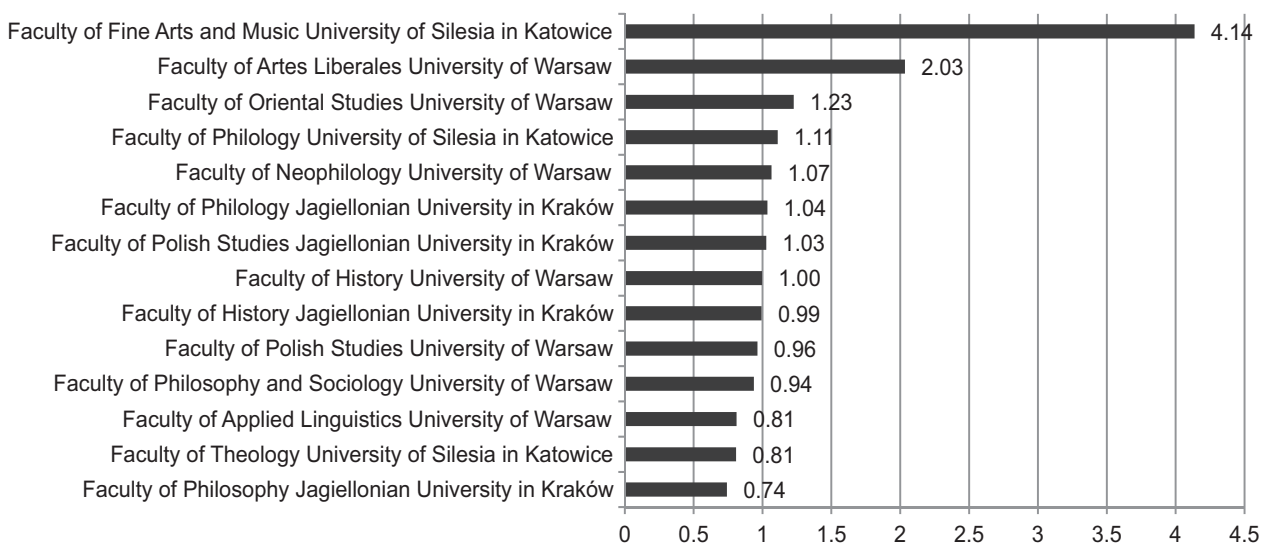

Fig. 3. Average annual value of the Malmquist Productivity Index for specific humanities faculties
Source: Own study.

Considering the Technical Efficiency Change Index (EFCH) of faculties, it was observed that, in the studied period, 8 faculties regularly improved their technical efficiency each year. The highest average annual technical efficiency change indexes have been observed at the Faculty of Arts of the Silesian University (3.46) and the Faculty of Applied Linguistics of the Warsaw University (2.19) – Figure 4. On the other hand, the Faculty of Philosophy and Sociology and the Faculty of History of the Warsaw University had the lowest (below 1) average annual technical efficiency change indexes. The largest average annual increases of the Technical Efficiency Change Index (TECH) have been noted at the Faculty of *Artes Liberales*, Faculty of History and Faculty of Philosophy and Sociology of the Warsaw University (Fig. 5). It can also be assumed that the smallest technology growth occurred at the Faculty of Applied Linguistics of the Warsaw University.
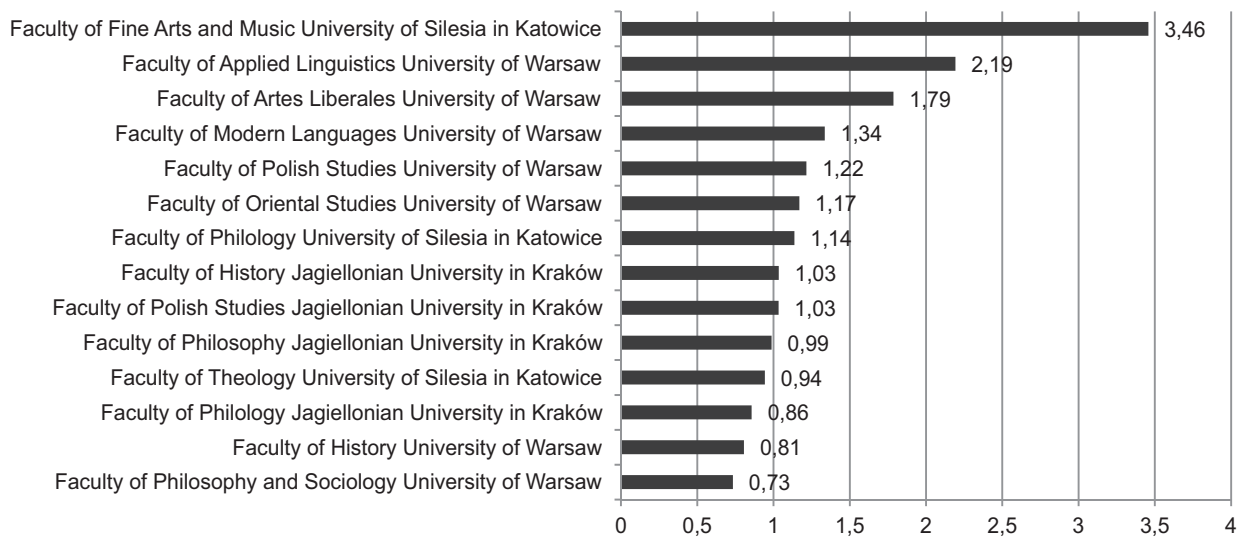

Fig. 4. Average annual change of technical efficiency (EFCH) of specific humanities faculties
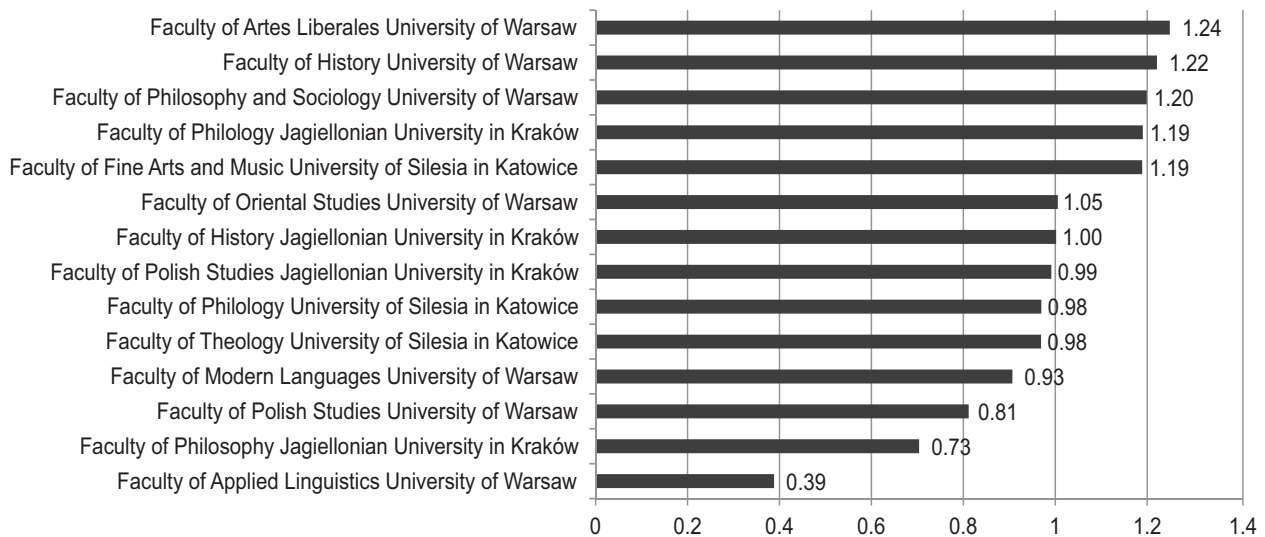Source: Own study.

Fig. 5. Average annual change of technology growth (TECH) of studied humanities faculties
Source: Own study.

CONCLUSIONS

Studies on the efficiency of humanities faculties have led to formulating the following conclusions:

1. In the period from 2008/2009 to 2014/2015, the average level of the MPI of the studied faculties was 28%. Changes in technical efficiency, which amounted to 34% per year on average, were the main factor driving increased productivity of faculties.
2. The highest MPI values have been noted at the following faculties: Faculty of Arts of the Silesian University (4.14) and Faculty of *Artes Liberales* of the Warsaw University (2.03).
3. The largest average annual changes of technical efficiency occurred at the Faculty of Arts of the Silesian University (3.46) and the Faculty of Applied Linguistics of the Warsaw University (2.19). In turn, the largest changes of technology growth were discovered at three Warsaw University faculties: *Artes Liberales* (1.24), History (1.22) and Philosophy and Sociology (1.20).

Accordingly, the obtained results allowed to confirm the adopted research hypotheses. The authors are, however, aware that the assumptions made and methods used are full of defects.

One may challenge the adopted assumption that universities (or, more specifically, humanities faculties) should be viewed as "black boxes" whose activity consists of transforming inputs (expenditures) into outputs (effects). It should be added, however, that universities are nowadays expected to make their activities cost-efficient just like enterprises do. Universities are being transformed into enterprising universities, largely for objective reasons (due to problems with financing from public funds or growing competition from alternative education institutions). The set of diagnostic variables used in the study is not without controversy, either. The adopted approach resulted from lack of access to microdata on quality in particular areas of faculty activities, for example the number of students graduating with first class honours, time necessary for graduates to find a job, number of publications in journals on the MJL (Master Journal List). It should be noted, however, that the diagnostic variables used by the authors were widely used in both domestic and foreign studies on measuring the efficiency of higher education institutions.

Another round of criticisms of the achieved study results can be derived from the applied method. The Malmquist Productivity Index is sensitive to uncommon observations as well as changes in the number of inputs/outputs or objects. Similarly, the applied method is not statistical in nature and hence the statistical properties of obtained results, such as statistical errors, cannot be determined. It should therefore be stressed that the quality and credibility of study results depend on the selection, quality and completeness of the empirical material.

Consequently, there is a need to continue studying the efficiency of public universities and their faculties, applying the Malmquist Productivity Index among others. In this respect, it would be worthwhile to operate on large, yet homogeneous research samples. This will allow to use a larger number of variables, both as inputs and outputs, and also to avoid issues resulting from sensitivity to uncommon data.

REFERENCES

Abbott, M., Doucouliagos, C. (2003). The Efficiency of Australian Universities: a Data Envelopment Analysis. Economics of Education Review, 22, 89–97.

Agasisti, T., Johnes, G. (2009). Beyond frontiers: comparing the efficiency of higher education decision-making units across more than one country. Education Economics, 1, 59–79.

Agasisti, T., Pérez-Esparrells, C. (2010). Comparing efficiency in a cross-country perspective: the case of Italian and Spanish state universities. Higher Education, 59, 85–103.

Agasisti, T., Ricca, L. (2016). Comparing the Efficiency of Italian Public and Private Universities (2007–2011): An Empirical Analysis. Italian Economic Journal, 2, 57–89.

Baran, J. (2014). Changes in productivity of agriculture after Polish accession to the European Union. Acta Sci. Pol. Oeconomia, 13 (3), 5–15.

Bayraktar, E., Tatoglu, E., Zaim, S. (2013). Measuring the relative efficiency of quality management practices in Turkish public and private universities. Journal of Operational Research Society, 64, 1810–1830.

Bórawski, P., Pawlewicz, A. (2006). Efektywność ekonomiczna indywidualnych gospodarstw rolnych w aspekcie zrówno-ważonego rozwoju obszarów wiejskich na przykładzie województwa warmińsko-mazurskiego [Economic efficiency of individual agricultural farms in the context of sustained development of rural areas on the example of the Warmińsko--Mazurskie province]. Research Bulletin of the Wrocław University of Environmental and Life Sciences, 540, 91–97 [in Polish].

Carrington, R., Coelli, T., Rao, D.S.P. (2005). The Performance of Australian Universities: Conceptual Issues and Preliminary Results. Economic Papers, 2, 145–163.

Coelli, T.J., Prasada, Rao D.S., O'Donnell, C.J., Battese, G.E. (2005). An Introduction to Efficiency and Productivity Analysis. Springer, New York.

Cooper, W.W., Seiford, L.M., Tone, K. (2007). Data Envelopment Analysis. A Comprehensive Text with Models, Applications, References and DEA-Solver Software. Kluwer Academic Publisheres, New York.

Czerepaniak-Walczak, M. (Ed.) (2013). Fabryki dyplomów czy *universitas*? [Diploma mills or universities?]. Impuls Publishing House, Kraków.

Ćwiąkała-Małys, A. (2010). Pomiar efektywności procesu kształcenia w publicznym szkolnictwie akademickim [Measuring the efficiency of the teaching process in public university education], Wrocław University Press, Wrocław [in Polish].

Färe, R., Grosskopf, S., Norris, M., Zhang, Z. (1994). Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries. The American Economic Review, 84, 66–83.

Glass, J.C., McCallion, G., McKillop, D.G., Rasaratnam, S., Stringer, K.S. (2006). Implications of Variant Efficiency Measures for Policy Evaluations in UK Higher Education. Socio-Economic Planning Sciences, 40, 119–142.

Hu, Y., Liang, W. (2008). Malmquist index analysis of the dynamic changes in scientific research productivity of some Chinese universities before and after merger. Frontiers of Education in China, 3, 429–447.

Johnes, J., Johnes, G. (1995). Research Funding and Performance in U.K. University Departments of Economics: A Frontier Analysis. Economics of Education Review, 14, 301–314.

Jóźwiak, W. (1998). Efektywność gospodarowania w rolnictwie [Efficiency of agricultural management] [In:] A. Woś (Ed.), Encyklopedia agrobiznesu [Agricultural business encyclopaedia]. Fundacja Innowacja Publishing House, Warszawa [in Polish].

Kaneko, M. (1997). Efficiency and Equity in Japanese Higher Education. Higher Education, 34, 165–181.

Kounetas, K., Anastasiou, A., Mitropoulos, P. (2011). Departmental efficiency differences within a Greek University: An application of a DEA and Tobit analysis. International Transactions in Operational Research, 5, 545–559.

Kozuń-Cieślak, G. (2013a). Efektywność – rozważania nad istotą i typologią [Efficiency – thoughts on its essence and typology]. Studia i Prace – Kwartalnik Kolegium Ekonomiczno-Społecznego, 16, 13–42 [in Polish].

Kozuń-Cieślak, G. (2013b). Efektywność – ewolucja koncepcji w retrospekcji teorii ekonomii [Efficiency – conceptual evolution in economic theory retrospection]. Studia i Prace. Kolegium Zarządzania i Finansów, 128, 157–181.

Kulawik, J. (2010). Efektywność przedsiębiorstw wielkotowarowych w rolnictwie [Efficiency of large-scale enterprises in agriculture]. Zagadnienia Ekonomiki Rolnej, 3 (324), 43–63 [in Polish].

Leitner, K.H., Prikoszovits, J., Schaffhauser-Linzatti, M., Stowasser, R., Wagner, K. (2007). The impact of size and specialisation on universities' department performance: a DEA analysis applied to Austrian universities. Higher Education, 53, 517–538.

Mamun, S.A.K., Rahman, M.M. (2016). An investigation on allocative efficiency and implications of new funding plans for Australian universities. Educational Research for Policy and Practice, 15, 71–82.

Penc, J. (1997). Leksykon biznesu [A business lexicon]. Placet, Warszawa [in Polish].

Pietrzak, P. (2016). Efektywność funkcjonowania publicznych szkół wyższych w Polsce [Efficiency of functioning of public universities in Poland]. Warsaw University of Life Sciences Press, Warsaw [in Polish].

Sułkowski, Ł. (2016). Kultura akademicka. Koniec utopii? [Academia culture. The end of utopia?]. PWN, Warszawa [in Polish].

Szkolnictwo wyższe w Polsce [Higher educaton in Poland (2013)]. Ministry of Science and Higher Education Press, Warszawa [in Polish].

Szuwarzyński, A. (2006). Metoda DEA pomiaru efektywności działalności dydaktycznej szkół wyższych [The DEA meth-

od of measuring the efficiency of teaching activities of universities]. Nauka i Szkolnictwo Wyższe, 2 (28), 78–88 [in Polish].

Świtłyk, M., Wilczyński, A. (2015). Zastosowanie indeksu Malmquista do badania zmian efektywności uczelni publicznych [Using the Malmquist index to measure changes in efficiency of public universities]. Working Papers of the Wrocław University of Economy, 401, 514–524 [in Polish].

Taylor, B., Harris, G. (2004). Relative efficiency among South African universities: A data envelopment analysis. Higher Education, 47, 73–89.

Wolszczak-Derlacz, J. (2013). Efektywność naukowa, dydaktyczna i wdrożeniowa publicznych szkół wyższych w Polsce [The scientific, teaching and implementation efficiency of public universities in Poland]. Gdańsk University of Technology Press, Gdańsk [in Polish].

Wolszczak-Derlacz, J. (2015). Analiza efektywności działalności uczelni europejskich i amerykańskich – podejście nieparametryczne [Analysing the efficiency of activities of European and US universities – a non-parametric approach]. Ekonomia, 40, 109–130 [in Polish].

Worthington, A.C., Lee, B.L. (2008). Efficiency, technology and productivity change in Australian universities, 1998–2003. Economics of Education Review, 27, 285–298.

ZASTOSOWANIE INDEKSU PRODUKTYWNOŚCI MALMQUISTA DO BADANIA ZMIAN EFEKTYWNOŚCI WYDZIAŁÓW REPREZENTUJĄCYCH NAUKI HUMANISTYCZNE

STRESZCZENIE

Celem podjętych badań było określenie zmian w efektywności wydziałów grupy nauk humanistycznych z zastosowaniem indeksu produktywności Malmquista (MPI). W analizach uwzględniono 14 jednostek organizacyjnych uczelni podległych nadzorowi Ministra Nauki i Szkolnictwa Wyższego, dla których dostępne były odpowiednie dane. W latach 2008/2009 – 2014/2015 przeciętna wartość indeksu Malmquista wynosiła 28%, co wskazuje na poprawę produktywności wydziałów. Zmiany postępu technologicznego nie miały wpływu na wielkość indeksu, ponieważ średnia wartość w analizowanym okresie oscylowała wokół jedności. Głównym czynnikiem wzrostu produktywności wydziałów były zmiany w zakresie efektywności technicznej, które kształtowały się przeciętnie na poziomie 34% rocznie.

Słowa kluczowe: szkolnictwo wyższe, efektywność, indeks produktywności Malmquista