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UNIVERSITY BRAND AS A KEY FACTOR OF GRADUATES EMPLOYMENT

Abstract. *The aim of this article is to establish a comparison in the degree of efficiency of European universities in the management of the labour insertion of their graduates. The methodology used is the data envelopment analysis (DEA). This type of analysis enables the measurement of the relative efficiency of different organizational units in situations where there is information about multiple inputs and outputs of resources. We define one hundred and twenty-six Decision Making Units (DMU) corresponding to each of the European universities analysed in our study. Developed analysis has allowed to determine the position that each of them occupies in relation to an efficiency frontier. Obtained results have allowed identifying 13 universities that show a score 100. In the interval 99-90 are 5. Between 89-80, we have 7. Between 79-70, 7. For the interval 69-60, 13. Between 59-50 are 19. Between 49-40, 20. Between 39-30, 13. And finally between 29-20 there are 19. The universities with a score of 100 belongs to France (Ecole polytechnique and Ecole des Ponts ParisTech), Italy (Politecnico di Torino), Portugal (Universidade Nova de Lisboa), Spain (University of Navarra and University Carlos III of Madrid), Sweden (Chalmers University of Technology), Switzerland (University of St. Gallen) and United Kingdom (University of Cambridge and University of Oxford). These universities represent the optimum of efficiency if they are compared with the others analysed. The universities that have to improve the employability of its graduates by more than 74% to reach the optimum of efficiency are mostly in the United Kingdom and Sweden, but there are in other regions as Austria, Belgium, Denmark, Germany and Netherlands. Among the main conclusions of this study, we would like to highlight how European university students present employment levels above those workers with lower levels of education. This data points to the high level of general efficiency achieved by university education in improving the degree of employability of its students.*

Keywords: data envelopment analysis, efficiency, employment, higher education, productivity.

Introduction. In 2017, the unemployment rate in the European Union was 7.6%. By gender, 7.4% corresponded to men and 7.9% to women. If these data were analysed by educational levels (Figure 1), since 2008 the unemployment rate of citizens with lower levels of education (levels 0-2) was greater than double that of those who have obtained Higher education (levels 5-8).

There are a large number of studies about the relationship between the level of employability of citizens and their educational level. In the last decades, the main research works were Becker (1994), Nickell (1997), Esping-Andersen and Regini (2000), Heath et al. (2008) or Nunez and Livanos (2010). Likewise, the different governments of European countries have incorporated the relationship between training and employment in the formulation of their public policies, developing specific programs to improve the levels of education of their citizens. The European Commission developed several initiatives with the aim of improving professional qualifications.

Specifically, the aim of the strategy for smart, sustainable and inclusive growth – EUROPE 2020 – is to reduce the dropout rate to less than 10%, and at least the 40% of the younger generation should have completed higher education. The strategy Europe 2020 will implement the following initiatives in different EU countries:

– «Youth on the Move». The objective is to improve the results of education systems and facilitating the entry of young people into the labour market.

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– «Agenda for new qualifications and jobs». The purpose is the modernization of labour markets and the empowerment of students through the development of professional skills.

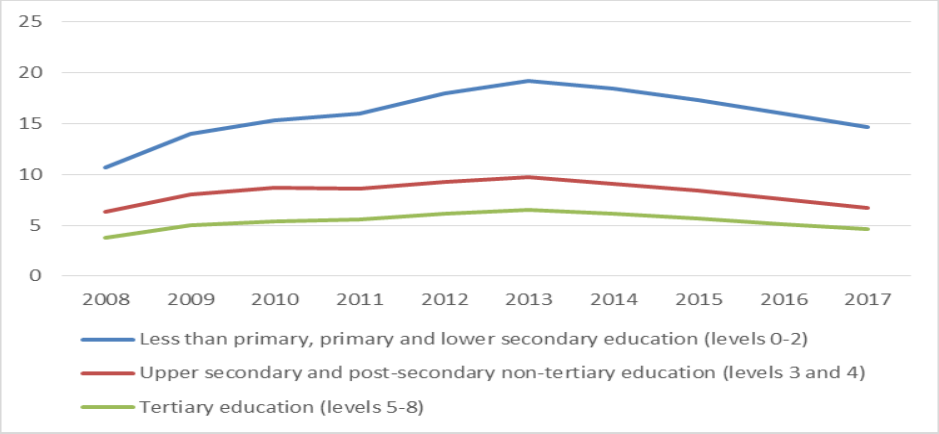

Figure 1. Unemployment rates by educational levels.

Source: Developed by the authors on the basis of Eurostat (2018).

Figure 2 shows the breakdown of public expenditure on education by educational levels. We use the average of the following countries: Belgium, Austria, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Portugal, Spain, Sweden, Switzerland, and United Kingdom. The different regional governments invested more economic resources for tertiary level students than the primary and secondary levels.

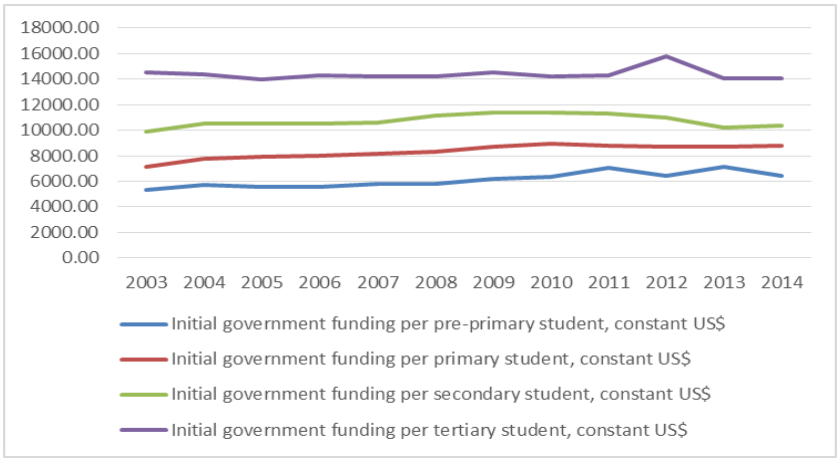

Figure 2. Public expenditure on education by educational levels.

Source: Developed by the authors on the basis of World Bank Data (2018).

Despite the important relationship that exists between educational levels and employment, most of the research carried out in the field of higher education only focus on its function as research centres, obviating the relevant role in improving employability of their graduates.

There are several international rankings in which the relative position of each university is determined by its research activity:

- Academic Ranking of World Universities (Shanghai Ranking Consultancy);
- World University Rankings (Times Higher Education, Performance Ranking of Scientific Papers for World Universities, Higher Education Evaluation and Accreditation Council of Taiwan);
- Ranking Web of World Universities (Cybermetrics Lab (CCHS), a unit of the Spanish National Research Council (CSIC));
- UTD Top 100 Business School Research Rankings (The UT Dallas' School of Management).

QS World University Rankings (Quacquarelli Symonds) is the only indicator that includes an analysis of the degree of employability of university graduates – QS Graduate Employability Rankings. It is formed from the following variables: reputation of the employer, results of the students, relations between universities and companies, relations between students and employers and the employment rate of graduates.

The main objective of this article is to carry out a study on the degree of efficiency of European universities from a labour perspective. For the purposes of the article was used the Data Envelopment Analysis methodology (DEA), based on a statistical tool that is frequently used by researchers in the performance of comparative efficiency analysis between different decision units (DMU).

Literature review. DEA is a statistical tool frequently used by researchers in their analysis of organizational efficiency and applied to various sectors of social and economic sector. Emrouznejad and Yang (2018) presented a quantitative and qualitative analysis on its application in different studies carried out for the period 1978-2016, and which have been finally published as an article, chapter of a book or conference. A total of 10,300 studies were analysed. Among its main conclusions, it should be noted that since Charnes et al. (1978) published their article entitled «Measuring the efficiency of decision making units», the growth experienced by the research work using this tool has been exponential.

In the analysed areas, the education sector has been studied repeatedly by researchers. It is important to highlight the contributions of Camilli et al. (2010), Bessent and Bessent (1980) or Ruggiero and Vitaliano (1999). In the specific field of higher education, it is worthy to mention the research works of Sarrico et al. (1997), Chu Ng and Li (2000), Avkiran (2001), Taylor and Harris (2004), Warning (2004), Johnes (2006), Lee and Worthington (2006), Leitner et al. (2007), Taylor and Harris (2004) and Koksal and Nalçaci (2006).

Among them, the authors have focused mainly on the field of knowledge management. However, there are not many studies on efficiency analysis from a work perspective. Therefore, this research work is presented to compare the degree of efficiency of European universities from the perspective of labour insertion.

Methodology and research methods. The non-parametric methodology used in this work is the Data Envelopment Analysis (DEA), proposed by Charnes et al. (1978). During the research was defined the production function and 126 Decision Making Units (DMU's) corresponding to the European universities.

The objective of this function is to achieve the greatest increase in the labour insertion indicator, assuming an orientation towards output. In addition, was proposed the utilization the model of variable returns to scale known as BCC-Output, which yields a measure of the pure technical efficiency that ignores the impact of scale size by comparing only one DMU to a unit of similar scale. The main reason is that there is no certainty about the type of return of the production function.

For the choice of inputs/outputs, was carried out a comparative analysis of the main contributions of application of DEA model to the analysis of university efficiency. In this comparison, it has become clear

how most of the analysed researches have used outputs related to academic activity, research or both at the same time.

Among the authors who use output variables directly related to the teaching activity we find Johnes (2006) and Bessent and Bessent (1980). Specifically, Johnes uses as outputs the total number of first degrees awarded weighted by degree classification; total number of higher degrees awarded (includes both doctorate and other higher degrees); value of the recurrent grant for research awarded by the Higher Education Funding Council for England (HEFCE) in £. Bessent and Bessent use the median percentile reading achievement for only those pupils in attendance at the school for a full year; median percentile mathematics achievement test score for only those pupils in attendance for a full year.

Chu Ng and Li (2000) and Warning (2004) apply outputs linked to the research activity. Chu Ng and Li use the number of manuscripts; number of articles; number of recognized research outputs; number of contracts and number of prizes. Warning analyse outputs related to Science Citation Index (SCI) data for the natural sciences and on the Social Science Citation Index (SSCI) and the Arts and Humanities Index (AHI) for the social sciences. Since the ISI3 incorporates only quality journals in its indexes, the computed score provides information on both quality and quantity of publications. The ‘‘publication” variable includes total number of publications from 1997 to 1999, amounting to 14,176 in the SCI and 893 in the SSCI and AHI.

Finally, it is important to highlight how most of the researches consulted use outputs related to both teaching and research activity. Taylor and Harris (2004), Martín (2007), Correas and Jorge (2010), Lee and Worthington (2016), Sagarra et al. (2017), Marti et. al. (2014), Avkiran (2001), Leitner et al. (2007), Taylor and Harris (2004) y Koksal and Nalçaci (2006). Taylor and Harris employ the completed academic qualifications (degrees, diplomas and certificates); research output (books, articles in approved journals, conference proceedings and patents/licenses and research income). Martín the number of students; number of graduates; average score in the evaluation survey; teachers’ load; number of publications; external aid for research; number of Ph.D. thesis; number of citations. Correas and Jorge the number of students enrolled; number of graduate students; number of Ph.D. thesis; number of publications; number of scientific documents in indexed journals; % of teaching staff with one or more research sections; number of research projects; patents applications. Lee and Worthington make use of an indicator of publications and the Grants’ Students. Sagarra et al. the papers indexed in Scopus and the graduates. Marti et. al. the number of graduates; the revenue from research and the number of Ph.D. thesis. Avkiran the overseas fee-paying enrolments, EFTSU non-overseas fee-paying postgraduate enrolments, EFTSU. Leitner et al. use the examinations; the finished supervised diploma thesis; monographs; journal papers; project reports; presentations; other publications; finished supervised PhD thesis; patents; financial funds provided by third parties; finished projects and personal; finished projects of the department. Taylor and Harris the degrees; diplomas and certificates; books; articles in approved journals; conferences; Patents/licenses; research income. Koksal and Nalçaci use the research activities and quality; education activities and quality; other activities and Graduates.

It shows how researchers have oriented their research to the analysis of the degree of efficiency in its academic aspect, avoiding the important role that universities are functioning as centres of professional insertion of their graduates. Therefore, in this article, was proposed to use a variable output related to the improvement in the degree of employability of students. In particular, the variable is the overall score calculated for the indicator QS Graduate Employability and which is the result of weighting the following variables: reputation of the employer; student marks; university-industry collaboration, Employer/Student Connections and Graduate Employment Rate. Table 1 shows the weighting factor applied to the variables, as well as their definition.

Table 1. Methodology for calculating the indicator QS Graduate Employability

Variable	Weighting factor	Definition
University reputation	30%	Value that entrepreneurs assign to the universities that offer the most competent, innovative and effective graduates.
Graduate students	25%	Number of students who are considered as innovative, creative, wealthy, enterprising and / or philanthropic people of the world.
Industry-university collaboration	25%	This indicator comprises from two parts. First, it uses Elsevier's Scopus database to identify which universities are collaborating successfully with international companies. Second, it considers the associations related to job placement that are informed by the institutions and validated by the QS research team.
Participation of employers in university activities for employment	10%	This indicator implies adding the number of entrepreneurs who have actively participated in the university campus in last twelve months, allowing students the opportunity to establish contacts and acquire information on how to work in their companies. This 'active presence' can take the form of participating in career fairs, organizing company presentations or any other self-promotion activity.
University employment rate	10%	Measures the proportion of graduates (excluding those who chose to continue studying or are not available to work) in a full-time or part-time job within 12 months after graduation.

Source: Developed by the authors on the basis of QS Graduate Employment (2018).

The choice of output has conditioned the number of universities used in the study, since there is no calculation for all European universities. The following table shows the selected universities and country of origin.

Table 2. Universities analysed in the study

Region	University
Austria	University of Vienna
	Vienna University of Technology
	Universitat Innsbruck
Belgium	Universite libre de Bruxelles
	Universite de Liege
	Vrije Universiteit Brussel (VUB)
	KU Leuven
	Ghent University
	Universite catholique de Louvain (UCL)
	University of Antwerp
Czech Republic	Charles University
Denmark	Aarhus University
	University of Copenhagen
	Technical University of Denmark
	Aalborg University
Estonia	University of Tartu
Finland	Aalto University
	University of Turku

Continued Table 2

France	Ecole Polytechnique
	CentraleSupelec
	Sciences Po
	Universite Pierre et Marie Curie (UPMC)
	Universite Paris 1 Pantheon-Sorbonne
	Universite Paris-Dauphine, PSL Research University
	Ecole des Ponts ParisTech
	Universite de Montpellier
	Ecole normale superieure, Paris
Germany	KIT, Karlsruhe Institute of Technology
	Technische Universitat Darmstadt
	Technical University of Munich
	Technische Universitat Berlin (TU Berlin)
	RWTH Aachen University
	Ludwig-Maximilians-Universitat Munchen
	Universitat Stuttgart
	Friedrich-Alexander-Universitat Erlangen-Nurnberg
	Universitat Konstanz
	Technische Universitat Dresden
	Humboldt-Universitat zu Berlin
	Universitat Mannheim
	Eberhard Karls Universitat Tubingen
	Freie Universitaet Berlin
	Universitat Frankfurt am Main
	University of Gottingen
	Johannes Gutenberg Universitat Mainz
	Rheinische Friedrich-Wilhelms-Universitat Bonn
Ireland	University College Dublin
	Trinity College Dublin, The University of Dublin
	Dublin City University
	National University of Ireland Galway
Italy	Politecnico di Milano
	Alma Mater Studiorum – University of Bologna
	Sapienza University of Rome
	Politecnico di Torino
	Università di Padova
Netherlands	Maastricht University
	University of Twente
	Delft University of Technology
	University of Amsterdam
	Erasmus University Rotterdam
	Eindhoven University of Technology
	Leiden University
	University of Groningen
	Vrije Universiteit Amsterdam
Portugal	University of Lisbon
	Universidade Nova de Lisboa
	University of Porto

Continued Table 2

Spain	University of Navarra
	Complutense University of Madrid
	University of Barcelona
	Polytechnic University of Catalonia
	Autonomous University of Barcelona
	Charles III University of Madrid
	Autonomous University of Madrid
	Polytechnic University of Valencia
Sweden	Uppsala University
	Chalmers University of Technology
	KTH Royal Institute of Technology
	Karolinska Institutet
	Linkoping University
	Stockholm University
	University of Gothenburg
Switzerland	ETH Zurich – Swiss Federal Institute of Technology
	University of Zurich
	University of St.Gallen (HSG)
	University of Basel
	University of Geneva
	University of Lausanne
United Kingdom	University of Aberdeen
	Heriot-Watt University
	University of Sussex
	University of Cambridge
	University of Oxford
	UCL (University College London)
	Imperial College London
	The University of Manchester
	University of Bristol
	London School of Economics and Political Science (LSE)
	University of Nottingham
	The University of Edinburgh
	King's College London
	The University of Warwick
	University of Leeds
	Durham University
	University of Birmingham
	University of Surrey
	The University of Sheffield
	University of Southampton
	Loughborough University
	Cardiff University
	Newcastle University
	University of Bath
	University of Liverpool
	Aston University
	University of Glasgow
	City, University of London

Continued Table 2

United Kingdom	Queen's University Belfast
	The University of Exeter
	Lancaster University
	University of St Andrews
	University of York
	University of Reading
	Oxford Brookes University
	Queen Mary University of London
	University of Essex
	University of Kent
	University of Leicester
	University of Strathclyde

Source: developed by the authors on the basis of QS Graduate Employment (2018).

Regarding the input variables used in this article a detailed analysis of the input variables used by the researchers has been carried out prior to their definition. In general, the authors use as input variables related to the teaching staff and the students. Therefore, Johnes (2006) uses the total number of FTE undergraduate students studying for a first degree multiplied by the average A level points for first year full-time undergraduate students (A level score is averaged over 1994/95, 1995/96, 1996/97 and 1997/98. Note that A=10, B=8, C=6, D=4, E=2); total number of FTE postgraduate students; total number of full-time academic staff for teaching, or teaching and research, or research only purposes; total depreciation and interest payable in £; total expenditure on central libraries and information services, and on central computer and computer networks excluding academic staff costs and depreciation in £ and the expenditure on central administration and central services excluding academic staff costs and depreciation in £. Bessent and Bessent (1980) consider the pupil inputs measured by the California Achievement Test in May, 1976. Chu Ng and Li (2000) the number of researchers, number of research supporting staff and the budget funds (in thousand RMB). Avkiran (2001) take into account the academic staff and non-academic staff. Taylor and Harris (2004) uses the total expenditure, capital employed, capital employed and student numbers, capital employed and staff numbers, capital employed and adjusted expenditure, capital employed and total expenditure and student numbers and staff numbers. Warning (2004) consider the inputs used to measure staff, both scientific and non-scientific, and overhead expenditures, including spending on library resources, computing services and further infrastructure. Martín (2007) uses the number of full-time lecturers; number of part-time lecturers; number of full-time equivalent lecturers; number of permanent lecturers; number of non-permanent lecturers; number of scholars; lecturers' salary; number of students; teacher load; infrastructures; number of computers; physical investment; budget; external aid for research and expenses in books and magazines. Correas and Jorge (2010) used the personal expenses; current expenses in goods and services; lecturers' expenses and other expenses. Marti et. al. (2014) the number of students enrolled; current expenses; number of full-time lecturers. Lee and Worthington (2016) employ the FTE academic and PhD students. Finally, Sagarra et al. (2017) use the full time equivalent faculty, total enrolment and the first joining graduates.

As a result, were chosen two types of input variables. On the one hand, the one related to the undergraduate and postgraduate students. On the other, the teaching staff, both national and foreign.

Table 3 shows the production function in the level of university work efficiency on which the Data Envelopment Analysis has been applied, in which the inputs and outputs are disaggregated.

Table 3. Production function

Type	Variable		Description
Output	(QS) Overall score		Overall score calculated for the indicator QS Graduate Employability
Inputs	(I.1) Bachelor students	(I.1.1) National bachelor students	Number of national and international students enrolled in bachelor studies
		(I.1.2) International bachelor students	
	(I.2) Postgraduate students	(I.2.1) National postgraduate students	Number of national and international students enrolled in postgraduate studies
		(I.2.2) International postgraduate students	
	(I.3) Teaching staff	(I.3.1) National teaching staff	National and international teaching staff related to bachelor and postgraduate studies
		(I.3.2) International teaching staff	

Sources: developed by the authors.

The level of reliability of the model depends on the relationship between the number of variables – inputs and outputs – defined in the production function and the DMU's considered. If there is not a suitable relationship between them, could be obtained results in which all the DMU's are efficient. This would complicate the results and a scenario of unrealistic maximum efficiency would become the decision-making condition.

To avoid this situation, was used the Cooper's Rule, which establishes the relationship between DMU's, inputs and outputs. In particular, the rule indicates that:

$$DMU's \geq \alpha \text{ (input + outputs)}$$

The above means that the number of DMU's considered in the model must be greater or at least equal to α times the sum of the inputs and outputs. The rule establishes that the minimum value to assume is α = 1.5, although many authors, with the purpose of obtaining more robust results, usually assume values of 2 or 3, as Pastor (1995), Belmonte and Plaza (2008) or Bartual and Garrido (2011). For the analysis developed in this investigation, we consider α> 3, above the minimum indicated by the Cooper's Rule.

Results. The model used is this article assumes the existence of variable returns to scale – BBC – in the estimation of the degree of efficiency. Likewise, was contemplated an orientation towards output (BBC-output model), based on the hypothesis of maximizing the QS indicator without having prior knowledge of the returns to scale that may be generated against the quantity of inputs applied to said maximizing purpose. Table 4 summarizes the statistics of the inputs/outputs variables defined in the production function.

Table 5 shows the results obtained from the application of the model. In the column (SCORE) were collected the relative position of each university with respect to an optimal point that has been assigned the value 100. This allowed to establish an order related to each DMU. Likewise, we add a column (IHE increase) that indicates the percentage of increase that the analysed DMUs should do in order to have their score at the maximum efficiency level.

Table 4. Summary of variable statistics inputs / outputs for the production function

Indicator	QS GRADUATE EMPLOYABILITY RANKINGS	National students		International students		Teaching staff	
	OVERAL SCORE AVERAGE	PG Students	UG Students	PG Students	UG Students	National	International
Variance	336.2033392	50,189,620.52	83,015,348.52	2,591,532.249	2,206,117.449	1,047,229.188	301,477.2725
Standard deviation	18.40789531	7,112.300218	9,147.076729	1,616.149131	1,491.136631	1,027.363172	551.2269127
Quasi-Variance	338.8506096	50,584,814.39	83,669,012.68	2,611,938.015	2,223,488.452	1,055,475.087	303,851.1093
Median	40.05	6,762.76	12,890.675	1,984.605	2,201.22	1,265	451
Coefficien of curtosis	-0.075367957	13.33573801	6.594644738	1.56521559	0.986359277	1.101068476	5.294569167
Coefficien of asymmetr	0.674883849	2.885657687	1.903254019	1.120916241	1.022121924	1.126259502	2.159860583
Maximum	96	54,114.5	60,302.82	8,102.08	8,169.7	5,147	2,964
Minimum	20.8	1,503.2	133.49	7.48	0	103	9
Rank	75.2	52,611.3	60,169.33	8,094.6	8,169.7	5,044	2,955

Source: Developed by the authors.

Table 5. Efficiency model «BBC-Output»

University	Score	Target
Ecole normale superieure. Paris	100	0
Ecole des Ponts ParisTech	100	0
University of St.Gallen (HSG)	100	0
Universidade Nova de Lisboa	100	0
Chalmers University of Technology	100	0
Charles III University of Madrid	100	0
Politecnico di Torino	100	0
Centrale Supelec	100	0
University of Navarra	100	0
Ecole Polytechnique	100	0
University of Oxford	100	0
ETH Zurich – Swiss Federal Insti	100	0
University of Cambridge	100	0
Aston University	96.43	3.57
KIT. Karlsruhe Institute of Tech	96.28	3.72
Politecnico di Milano	92.97	7.03
UCL (University College London)	91.98	8.02
Complutense University of Madrid	90.12	9.88
Technische Universitat Darmstadt	89.46	10.54
Delft University of Technology	87.71	12.29
Imperial College London	86.37	13.63
London School of Economics and Political Science (LSE)	84.8	15.2

Continued Table 5

The University of Manchester	83.75	16.25
University of Barcelona	81.77	18.23
University of Bristol	81.26	18.74
University of Nottingham	77.28	22.72
The University of Warwick	76.59	23.41
KTH Royal Institute of Technology	76.55	23.45
Durham University	76.07	23.93
Technische Universitat Berlin (TU Berlin)	75.92	24.08
University College Dublin	75.65	24.35
Universitat Mannheim	75.6	24.4
University of Leeds	75.32	24.68
Università di Padova	75.26	24.74
Alma Mater Studiorum – University of Bologna	74.38	25.62
The University of Edinburgh	73.63	26.37
Polytechnic University of Catalonia	73.48	26.52
Sapienza University of Rome	73.3	26.7
King's College London	73.23	26.77
Technical University of Munich	73.21	26.79
RWTH Aachen University	71.32	28.68
KU Leuven	71.18	28.82
Ludwig-Maximilians-Universitat Munchen	69.41	30.59
University of Turku	69.08	30.92
University of Lisbon	68.81	31.19
University of Birmingham	67.93	32.07
University of Amsterdam	65.77	34.23
Trinity College Dublin. The University of Dublin	64.44	35.56
Eindhoven University of Technology	64.25	35.75
Aarhus University	63.96	36.04
University of Zurich	63.82	36.18
University of Surrey	62.95	37.05
University of Porto	61.79	38.21
Erasmus University Rotterdam	60.51	39.49
Autonomous University of Barcelona	60.4	39.6
Loughborough University	58.46	41.54
The University of Sheffield	57.77	42.23
University of Southampton	57.35	42.65
Universitat Stuttgart	56.78	43.22
University of Copenhagen	56.65	43.35
University of St Andrews	56.16	43.84
Friedrich-Alexander-Universitat erlangen-nuremberg	55.74	44.26
University of Bath	54.52	45.48
Universitat Konstanz	54.42	45.58
Ghent University	54.3	45.7
Universite Paris-Dauphine. PSL Researchd University	54.28	45.72

Continued Table 5

Sciences Po	53.2	46.8
Autonomous University of Madrid	53.16	46.84
Cardiff University	53.13	46.87
Charles University	52.86	47.14
Newcastle University	52.47	47.53
Universite Pierre et Marie Curie (UPMC)	52.04	47.96
Universite catholique de Louvain	51.06	48.94
Maastricht University	50.58	49.42
University of Tartu	49.93	50.07
Polytechnic University of Valencia	49.64	50.36
Vienna University of Technology	49.6	50.4
University of Liverpool	49.54	50.46
Universite libre de Bruxelles	48.49	51.51
City. University of London	48.14	51.86
Universite Paris 1 Pantheon-Sorbonne	47.97	52.03
Queen's University Belfast	47	53
Technische Universitat Dresden	46.99	53.01
University of Glasgow	46.9	53.1
Aalto University	44.86	55.14
University of Vienna	43.62	56.38
Humboldt-Universitat zu Berlin	43.34	56.66
Lancaster University	43.22	56.78
Leiden University	42.61	57.39
Uppsala University	42.59	57.41
The University of Exeter	42.54	57.46
University of York	42.38	57.62
Universite de Montpellier	40.91	59.09
University of Groningen	40.42	59.58
University of Basel	38.88	61.12
Karolinska Institutet	37.55	62.45
Universitat Frankfurt am Main	37.55	62.45
Freie Universitaet Berlin	37.48	62.52
Vrije Universiteit Amsterdam	37.39	62.61
Technical University of Denmark	37.26	62.74
Universite de Liege	37.12	62.88
University of Reading	37.05	62.95
University of Aberdeen	36.74	63.26
Dublin City University	35.81	64.19
Eberhard Karls Universitat Tubin	35.73	64.27
University of Geneva	35.52	64.48
University of Lausanne	35.46	64.54
Oxford Brookes University	26.97	73.03
National University of Ireland Galway	26.49	73.51
University of Twente	25.96	74.04

Continued Table 5

Rheinische Friedrich-Wilhelms-Universitat Bonn	25.96	74.04
Heriot-Watt University	25.94	74.06
Linkoping University	25.78	74.22
University of Essex	25.68	74.32
University of Gothenburg	25.61	74.39
University of Leicester	25.57	74.43
University of Sussex	25.57	74.43
Aalborg University	25.55	74.45
University of Strathclyde	25.53	74.47
Johannes Gutenberg Universitat Mainz	25.47	74.53
University of Kent	25.22	74.78
University of Antwerp	25.13	74.87
Stockholm University	25.11	74.89
University of Gottingen	25.1	74.9
Universitat Innsbruck	25.07	74.93
Queen Mary University of London	24.75	75.25

Source: Developed by the authors.

Conclusions. In this article, was carried out a comparative analysis of the degree of efficiency of European universities in terms of labour insertion of their graduates. Firstly, was analyzed the literature, and was found that the majority of studies about university performance assess their research activity, leaving in the background its´ role in the improvement of the degree of employability of universities´ graduates.

For the purposes of the article was used the methodology to determine the degree of university work efficiency which incorporates an eminently business concept to university management, such as the efficiency frontier, in which a production function composed of three inputs has been defined – undergraduate, graduate and postgraduate students, teaching staff (national and international) – and one output – (QS) Overall score. The DEA analysis applied to this function determine the relative position of each university with respect to the efficiency frontier. The assessment has been made of each DMU that are determined by the spatial position of each one of the universities with respect to frontier to which we give the most efficient value.

Since the way in which the conversion of inputs into outputs is not directly determined exists a certain element of subjectivity in the analysis. Thus, the choice of other input or output variables in the application of the DEA would probably yield different values. To minimize the subjective component, was done a thorough analysis of the main inputs/outputs used in other investigations.

The results of this research show remarkable differences between the analyzed DMU. Thus, it has been possible to determine the existence of nine groups. Thus, 13 universities show a score of 100. In the interval 99-90 there are 5. Between 89-80, we have 7. Between 79-70, 7. For the interval 69-60, 13. Between 59-50 there are 19 between 49-40, 20. Between 39-30, 13. And finally between 29-20 there are 19.

The universities with a score of 100 belongs to France (Ecole polytechnique and Ecole des Ponts ParisTech), Italy (Politecnico di Torino), Portugal (Universidade Nova de Lisboa), Spain (University of Navarra and University Carlos III of Madrid), Sweden (Chalmers University of Technology), Switzerland (University of St. Gallen) and United Kingdom (University of Cambridge and University of Oxford). These universities represent the optimum of efficiency if they are compared with the others analyzed.

Likewise, has been included an analysis of objectives in which is indicated the effort that the DMUs must make in groups. Thus, those of the second group have to increase the score by 6%. The third group 15%. The fourth 25%. The fifth 34%. The sixth one 45%. The seventh 54%, the eighth 63% and finally the ninth 74%. The universities that have to improve the employability of its graduates by more than 74% to reach the optimum of efficiency are mostly in the United Kingdom and Sweden, but there are in other regions as Austria, Belgium, Denmark, Germany and Netherlands. This increase in the levels of effort was made more necessary by the greater potential that the university students have to find work on those people who have a lower level education.

Also, was considered necessary to broaden this analysis by means of a comparative study of the specific labour insertion policies developed by the analyzed DMUs, in such way that from it can be created a bank of good practices where can be reflected university policies of employment that are getting better results. Have to be mentioned that this field of research due to the economic importance of its results, should be considered more abundantly by the authors.

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Метою даної статті є порівняння європейських університетів за ступенем успішності працевлаштування їх випускників. Дослідження здійснено з використанням методу – аналіз середовища функціонування (АСФ). Авторами зазначено, що даний підхід дозволив визначити відносну ефективність різних організаційних підрозділів на основі аналізу інформації про багатоканальні входи та виходи всіх видів ресурсів. Емпіричне дослідження проведено на основі панельних даних, сформованих для вибірки з 1026 підрозділів відповідальних за прийняття рішень (ППР) у європейських університетах. Проведений аналіз дозволив проаранжувати досліджувані університети в залежності від успішності працевлаштування їх випускників. На основі отриманих емпіричних результатів дослідження виокремлено 13 університетів, які за шкалою мають 100 балів. До даної категорії увійшли університети з таких країн як: Франція

(École polytechnique and École des Ponts ParisTech), Італія (Politecnico di Torino), Португалія (Universidade Nova de Lisboa), Іспанія (University of Navarra and University Carlos III of Madrid), Швеція (Chalmers University of Technology), Швейцарії (University of St. Gallen) та Великобританія (University of Cambridge and University of Oxford). У свою чергу, в інтервалі 99-90 балів знаходяться 5 університетів; між 89-80 – 7 університетів; в інтервалі 69-60 – 13; в межах 59-50 – 19; 49-40 – 20; 39-30 – 13; 29-20 – 19. Авторами зазначено, що університети, яким необхідно підвищити рівень працевлаштування своїх випускників більше ніж на 74%, в основному, знаходяться у Великобританії та Швеції. При цьому університети Австрії, Бельгії, Данії, Німеччини та Нідерландів також повинні посилити заходи по підвищенню ефективності працевлаштування своїх випускників. У статті визначено, що одним із ключових факторів, шо впливає на рівень працевлаштування випускників є бренд університету. Таким чином, на основі отриманих результатів встановлено, що рівень працевлаштування випускників університетів, що формують історію свого бренду є вищим порівняно з іншими університетами, які не займаються питаннями промоції власного бренду.

Ключові слова: аналіз середовища функціонування, ефективність, трудова зайнятість, вища освіта, продуктивність.

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