

# An Attempt at a Simplified Determination of the Brand Value of a University

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## Abstract

The motivation for the analyses conducted as part of this paper was the development of an analytical tool to help build a university's brand value. The implementation of the adopted goal should provide a tool supporting activities aimed at creating the university's brand by leaders managing education at university level. The research hypothesis was that it is possible to determine a university's brand by using a synthetic measure of a university's brand value. The main scientific contribution of this article is the indication of variables that have not previously been used to determine the university's brand and which occur in IT systems related to the functioning of universities, so they can be used to support a more objective determination of a university's brand value. The analytical method used and the analyses carried out on that basis showed that synthetic measures can support the creation of a university brand. However, the very construction of a synthetic measure of a university's brand value that reflects reality requires the introduction of additional variables from IT systems and variables resulting from properly constructed surveys in the field of determining a university's brand value.

## Key words

university brand, synthetic measure, TOPSIS-CRITIC

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## 1. Introduction

Currently, all over the world, universities (including lower-level schools) are struggling with intense competition among themselves, mainly due to maintaining a significant number of places for students

(even if this number does not decrease, the number of prospective students is decreasing) and demographic decline (Novo-Corti et al., 2018; Yu et al., 2018). Contemporary universities are heavily involved in

competition for students, and one of the effective mechanisms that can connect them with potential students is their brand (Latif et al., 2021). Competition between universities can take various dimensions, but one of the important factors therein, which allows for a competitive advantage to be developed, is certainly the strengthening of a university's brand (Le, 2019). This situation forces universities to market their services, which in turn leads to the perception of students as customers of services provided by universities, and forces universities to position themselves as corporate brands (Yu et al., 2018). Globalisation has increased the demands on higher education and thus increased competition between universities. The Internet is but one of the tools that is considered a means of increasing competitiveness (Maresova et al., 2020).

Some research on university branding indicates that there are no clear indications that the best brands change significantly from year to year. Unlike typical market products, the quality of the university's brand may not result directly from its marketing or branding programme. The statement quoted in the previous sentence may not be true in the case of urban universities, because at such universities there are ways to improve the brand through marketing activities (Bunzel, 2007).

There are several definitions of a brand; however, due to the specificity of education, it can be assumed that a brand is a "promise" made to the buyer (student) by the seller (university) as to the features and advantages of the service (studies) (Davis, 2002). A brand in higher education is defined as everything that an institution expresses about itself (Alam et al., 2022). Building a university brand allows students to identify the quality of educational services offered (Harvey, 1996). Other researchers define the university brand as a student's feelings and emotions related to the experience of using the university's educational services (McNally and

Speak, 2002). According to other views, the university brand shows the quality of educational processes occurring at the university in a simplified way (Bulotaite, 2003).

When discussing a university's brand, we most often associate it with emotions related to the university, so it is advisable to conduct such branding activities that will create and at the same time consolidate the positive image of the university (Chapleo, 2010; Chapleo, 2011). When defining a university's brand, it is necessary to consider both the factors affecting the quality of educational services as well as the results describing the quality of educational services provided by universities (Sultan and Ho, 2014).

The concept of university branding is completely different from branding in the market sector. A university brand has different dimensions, understood as expressions, opinions and beliefs. It can therefore be assumed that a university's brand is determined by the link between the university's values and the expectations of stakeholders (students) (Nha and Leblanc, 2001). The basic aspect of brand awareness is understood as the strength of the brand in the mind of the consumer (Keller, 2020). Brand awareness has a strong influence on student decisions and the overall impression of a university's institutional value. The university brand indicates the university's ability to meet students' requirements, building trust in the university's competence in providing high-quality educational services to students (Alam et al., 2022). The analyses carried out in Vietnam on a group of private universities showed that the brand plays a decisive role in the choice of a university. The aforementioned studies also analysed the creation of brand trust through student satisfaction with the educational services offered by the university (Le, 2019).

Some researchers point out that the choice of a university by a prospective student depends on the possibility of taking up a job after graduation (Atay and Yildirim,

2010). Despite the satisfaction of students with the technical equipment available at the university, such as the canteen, laboratories, and access to computers, these are not the key factors determining the choice of university (Malik et al., 2010). The university branding model is sometimes presented as consisting of advertising, career guidance during the recruitment process, and activities known as “word of mouth”. These activities lead to the improvement of the university’s image in the eyes of students and thus to the improvement of the university’s reputation; as a result, student loyalty increases (Nguyen and Nguyen, 2015).

Currently, there is not a great deal of research focusing on university brands. One of the best known concepts is an internal brand equity assessment (teachers, administration employees) and external brand equity assessment (students) (Le, 2019).

The analysis of the impact of the Internet on the university’s brand value can be based on determining the number of fans, as well as the content, style, promotion and frequency of posts (Maresova et al., 2020). In some analyses, attention is paid to the sense of security among university students, which is why one of the factors determining the university brand is the analysis of safety reports on university campuses, particularly including sexual crimes (Gregory, 2012). The basic theory of brand equity analysis is based on customers; in this context it is assumed that the differential effect caused by consumer reactions to brand marketing activities is due to consumers’ specific brand awareness (Keller, 1993).

In one research paper, the brand equity study consisted in determining the level of students’ approval of six key brand features grouped in two groups of indicators, i.e. brand awareness and brand value. Brand value was assessed on the basis of overall satisfaction with the service, loyalty and brand preferences, while brand awareness was determined on the basis of brand

awareness and brand image. The brand awareness dimension was defined by brand recognition. On the other hand, the brand image was defined by product-related attributes, non-product-related attributes, and the symbolic and functional benefits of the brand (Alam et al., 2022). Brand image is defined as the perception of the brand reflected in consumers’ memories (Keller, 1993). Product-related attributes are characteristics that are considered essential to the performance of a product and are strongly associated with that product. The quality of education and physical facilities related to the provision of educational services are considered attributes related to the product, educational fee, speed of service by staff, admission criteria and degree of employment of graduates (Kurz et al., 2008; Chen, 2008).

Other features associated with the brand are external attributes related to the purchased product; these attributes include, among others, relations between students and the faculty, the range of the faculty’s influence, the history of the faculty, scientific and didactic excellence and reliability in terms of conducting classes with students (Chen, 2008; Kurz et al., 2008).

Symbolic attributes are related to brand identity and personality. These factors are responsible for recreating the emotional reactions evoked by the brand. We can also find claims that symbolic attributes focus on social support and external self-esteem. Customers strive to emphasise the uniqueness of the brand only because it can communicate the self-image of customers (Plummer, 2000).

In the analysis of university brands, the most frequently used variables are:

- in terms of brand recognition (advertisements in newspapers and magazines, sponsorship of sports events or other events, special articles about the university in newspapers and magazines, university brochures, posters, leaflets, etc., sources of obtaining information about

- the university, and knowledge of the services provided by the university) (Aaker, 2011; Aaker, 2003; Keller, 1993),
- in terms of attributes related to the product (evaluation of the quality of education, evaluation of the quality of teaching staff, attractiveness of equipment, conditions for obtaining education, and the approach of administrative staff) (Aaker, 2011; Aaker, 2003; Keller, 1993),
  - in terms of attributes not related to the product (value for money, affordability, the location of the university, a leading position in the provision of educational services, the reputation of the university, the level of protection of university facilities, and the number of years on the education market) (Aaker, 2011; Aaker, 2003; Keller, 1993),
  - in terms of functional benefits of the brand (additional attractions outside the study programme, support for intellectual development, providing reasons to be proud and thus building self-esteem, creating prospects for better employment) (Aaker, 2011; Aaker, 2003; Keller, 1993),
  - in terms of symbolic benefits of the brand (trustworthiness, competence, the prestige of the university in the environment, and didactic discipline) (Aaker, 2011; Aaker, 2003; Keller, 1993),
  - in terms of brand value (order of preferences in choosing a university by a candidate for studies, and the level of trust in the university) (Aaker, 2011; Aaker, 2003; Keller, 1993).

The concept of a brand in higher education, in particular, may be based on identity, reputation, company image and visual identity, analysed through the prism of marketing experiences (Dal Buono and Fortezza, 2017). An important element of branding is institutional communication; as such, special attention should be paid to the fact that trust in the cultural and educational role of the university cannot result only from

tradition, but must be continuously created through communication activities.

The use of the language of marketing in the area of higher education is surprising, because it is most often perceived as contradictory to the goals identified with the university environment, such as education, or the transfer of knowledge developed over the years resulting from scientific research, which is difficult to associate with generating profit (Dal Buono and Fortezza, 2017). The development of a university's brand may be understood as the effective use of institutional communication, which allows for greater recognition of the university and thus allows the university to strengthen the value of public recognition. Competition between universities mainly adopts student achievement as a factor differentiating the university's brand (Dal Buono and Fortezza, 2017). The university brand is a tool supporting the choices of candidates for studies and their families, as well as many other recipients to whom the university must communicate the value generated by it in the educational process. The university brand should guarantee the target recipients (students) that their expectations are fulfilled through the tangible and intangible elements of the education system. Some analyses may include the statement that the university's brand includes prestige, sincerity, attractiveness, spontaneity, conscientiousness and a cosmopolitan dimension. In addition, these activities are supported by brand loyalty, positive word of mouth and the willingness of graduates to support the university (Rauschnabel et al., 2016). In terms of branding a university, it is difficult to define what a successful university is.

## 2. Methodology

Research on university brands is usually based on surveys addressed to various stakeholder groups. In the presented study, the

university's brand (understood as a ranking position) was determined on the basis of reliable data from IT systems. The source of data for analysis was the portal <https://ela.nauka.gov.pl/pl> [accessed: 1 December 2022]. The data collected on this portal are characterised by a high degree of credibility as they are taken directly from the databases of the analysed universities; moreover, data on graduate salaries are taken from the institution responsible for recording salaries in Poland, namely the Social Insurance Institution.

The analysis covered universities offering master's (second degree) studies in the field of computer science in Poland. The selected period of analysis covered the years

2014-2020 and resulted from limitations in the availability of ELA system data.

The article proposes an original synthetic measure of university brand value. The aim was to suggest an analytical tool to support problem solving by leaders managing higher educational institutions. This measure was constructed on the basis of publicly available feedback describing the functioning of a university, and is intended to allow for the calculation of brand strength in relation to competition.

Variables used in synthetic measures were divided into stimulants (beneficial impact) and destimulants (adverse impact). Stimulants were subjected to zero unitarisation in accordance with Formula 1:

$$\text{stimulant: } z_{ij} = \frac{x_{ij} - \min_i\{x_{ij}\}}{\max_i\{x_{ij}\} - \min_i\{x_{ij}\}}, (i = 1, 2, \dots, n; j = 1, 2, \dots, k; z \in [0, 1])$$

where  $\min_i\{x_{ij}\}$  – the minimum value of function  $j$ ,  $\max_i\{x_{ij}\}$  – the maximum value of function  $j$ , and  $i$  – the object (in this case, a farm).

Destimulants were subjected to zero unitarisation according to Formula 2:

$$\text{destimulant: } z_{ij} = \frac{\max_i\{x_{ij}\} - x_{ij}}{\max_i\{x_{ij}\} - \min_i\{x_{ij}\}}, (i = 1, 2, \dots, n; j = 1, 2, \dots, k; z \in [0, 1])$$

where  $\min_i\{x_{ij}\}$  – the minimum value of function  $j$ ,  $\max_i\{x_{ij}\}$  – the maximum value of function  $j$ , and  $i$  – the object (in the case analysed, a farm).

The weights for the variables used were determined using the TOPSIS-CRITIC method. In this method, the standard deviation and the correlation between the variables are used by calculating the inverse matrix. It was assumed

that values exceeding 10 are too large and thus show excessive correlation between the variables (Borychowski et al., 2020). The weights of the variables were determined by the following formulas (Rostamzadeh et al., 2018):

$$w_j = \frac{c_j}{\sum_{k=1}^m c_k}, j = 1, 2, \dots, m; c_j = s_{j(z)} \sum_{k=1}^m (1 - r_{ij}), j = 1, 2, \dots, m,$$

where  $c_j$  – the measure of the information capacity of feature  $j$ ,  $s_j(z)$  – the standard deviation calculated from the normalised values of feature  $j$ , and  $r_{ij}$  – the correlation coefficient between features  $j$  and  $k$ .

In the next step, the weight coefficients were multiplied by the normalised values of the variables. In the next stage, the Euclidean distances of individual units from

the pattern and the anti-pattern of development were determined. For these activities, the following formulas were used:

$$d_i^+ = \sqrt{\sum_{j=1}^k (z_{ij}^* - z_{ij}^+)^2} - \text{distance from the pattern of development,}$$

$$d_i^- = \sqrt{\sum_{j=1}^k (z_{ij}^* - z_{ij}^-)^2} - \text{distance from the anti - pattern of development,}$$

where:

$$z_j^+ = (\max(z_{i1}^*), \max(z_{i2}^*), \dots, \max(z_{ik}^*)) = (z_1^+, z_2^+, \dots, z_i^+)$$

$$z_j^- = (\min(z_{i1}^*), \min(z_{i2}^*), \dots, \min(z_{ik}^*)) = (z_1^-, z_2^-, \dots, z_i^-)$$

At the next stage, the value of the synthetic feature  $q_i$  was determined according to the following formula (6):

$$q_i = \frac{d_i^-}{d_i^+ + d_i^-}, (i = 1, 2, \dots, n)$$

Variables used to construct the synthetic university brand measure:

- number of graduates (strength of impact of the brand on the labour market),
- time of seeking employment (months),
- Relative Earnings Index – the graduate's remuneration from all sources in the first year after graduation in relation to the average earnings in his/her place of residence. The greater the value, the better. Values above 1 mean that, on average, graduates earn above the average wage in their place of residence. On the other hand, values below 1 mean that, on average, graduates earn below the average wage in their place of residence.

– Relative Unemployment Index – the unemployment rate of graduates in the first year after graduation in relation to the overall unemployment rate in their place of residence. The lower the value, the better. Values below 1 mean that, on average, unemployment among graduates is lower than the unemployment rate in their place of residence. On the other hand, values above 1 mean that, on average, unemployment among graduates is higher than the unemployment rate in their place of residence.

Table 1 presents a list of variables and weights used in the TOPISIS-CRITIC analysis.

**Table 1.** The list of variables used to create the synthetic measure and weights of the variables

Year	Weight value for variables			
	Number of graduates (stimulant)	Time of searching for a full-time job (months) (destimulant)	Relative Earnings Index (stimulant)	Relative Unemployment Index (destimulant)
2014	0.372485	0.239486	0.195432	0.192597
2015	0.333230	0.218700	0.239534	0.208536
2016	0.284569	0.261873	0.196138	0.257420
2017	0.319474	0.183706	0.256630	0.240190
2018	0.276663	0.229581	0.229964	0.263792
2019	0.284344	0.262839	0.236376	0.216442
2020	0.283921	0.263023	0.199666	0.253390

Source: own elaboration

### 3. Brand value of universities in Poland – a case study

The synthetic measures determined show that in the scope of the analysed second-cycle studies in the field of computer science (second-cycle studies), the highest values were shown by AGH (2014, 2015, 2019, 2020) and PWroc. (2016, 2017, 2018) (Table 3). It is therefore interesting in this context to check which variables influenced the ranking position of the listed universities. Particular attention is paid to the value of the Relative Earnings Index variable, which in the case of AGH has a value from 2.01 in 2014, through 2.16 in 2015, to a decrease in the value of this variable to 1.71 in 2019 and 1.47 in 2020. At the same time, an inverse correlation between the Relative Earnings Index and the number of graduates should be noted; the lowest number of graduates was in 2014 (82 people) and the highest in 2020 (224 people). Each of the values discussed affects the value of the university's brand, as the number of graduates determines the number of 'private' ambassadors of the university, expressing their opinion about the completed studies and thus contributing to increasing

the popularity of the university. The second value, i.e. the Relative Earnings Index, indicates the main achievement of graduates in the labour market (Dal Buono and Fortezza, 2017). Other important variables indicating the success of graduates in the labour market are the time taken to find employment, counted in months, which in the case of AGH UST graduates does not exceed 1.5, and the Relative Unemployment Index, which does not exceed 0.3 (Table 2). Similar correlations to those described were also found in the case of PWroc., but in this case, apart from 2014 (35 graduates), much higher numbers of graduates were found, i.e. in the range from 139 to 174, so at the same time the brand of this university gained a large impact of graduates.

At the other end of the scale are the universities with the lowest synthetic measure of the university brand, comprising three universities: WULS-SGGW (2015, 2020) and UWM (2017-2019) and PRz (2014) (Table 3). It should be noted that these universities had a very low number of graduates, from 10 (2014 in the State University of Technology) to 11-13 (UWM) and 17 and 19 (SGGW) (Table 2).

**Table 2. Summary of data**

University	Variable	Year							Mean
		2014	2015	2016	2017	2018	2019	2020	
AGH	x <sub>1</sub>	82	88	88	110	79	170	224	120.14
	x <sub>2</sub>	1.02	0.91	0.79	1.20	1.41	0.96	1.04	1.05
	x <sub>3</sub>	2.01	2.16	2.09	1.55	1.87	1.71	1.47	1.84
	x <sub>4</sub>	0.04	0.19	0.07	0.05	0.26	0.10	0.16	0.12
PG	x <sub>1</sub>	48	26	140	121	149	98	98	97.14
	x <sub>2</sub>	0.76	0.71	0.44	0.64	0.78	0.87	1.22	0.77
	x <sub>3</sub>	1.79	2.08	1.68	1.83	1.72	1.63	1.46	1.74
	x <sub>4</sub>	0.08	0.20	0.24	0.10	0.40	0.36	0.58	0.28
UJ-WMii	x <sub>1</sub>	29	60	42	51	50	36	40	44.00
	x <sub>2</sub>	1.25	1.24	0.41	1.09	1.04	0.78	2.30	1.16
	x <sub>3</sub>	1.67	1.66	1.65	1.75	1.81	1.66	1.26	1.64
	x <sub>4</sub>	0.00	0.15	0.05	0.00	0.20	0.20	0.20	0.11
UJ-WFAiIS	x <sub>1</sub>	11	43	35	37	38	47	32	34.71
	x <sub>2</sub>	0.00	2.00	2.13	1.52	0.93	1.39	1.21	1.31
	x <sub>3</sub>	1.55	1.18	1.22	1.24	1.60	1.50	1.42	1.39
	x <sub>4</sub>	0.46	0.24	1.10	1.52	0.64	1.44	0.70	0.87
P Wroc.	x <sub>1</sub>	35	139	145	174	151	164	106	130.57
	x <sub>2</sub>	2.27	1.49	1.36	1.20	1.48	1.53	1.43	1.54
	x <sub>3</sub>	1.53	1.30	1.35	1.31	1.34	1.34	1.38	1.36
	x <sub>4</sub>	0.10	0.24	0.33	0.13	0.35	0.44	0.38	0.28
PJATK	x <sub>1</sub>	28	17	12	19	18	16	34	20.57
	x <sub>2</sub>	1.13	0.29	3.00	2.62	2.82	1.55	1.33	1.82
	x <sub>3</sub>	1.45	1.35	1.18	1.26	0.69	1.08	1.24	1.18
	x <sub>4</sub>	0.34	0.33	0.25	3.60	0.33	1.10	0.32	0.90
UG	x <sub>1</sub>	35	47	34	31	31	22	36	33.71
	x <sub>2</sub>	1.08	2.77	2.76	2.43	2.75	1.61	3.04	2.35
	x <sub>3</sub>	1.40	0.88	1.13	1.27	0.97	1.03	1.04	1.10
	x <sub>4</sub>	0.54	0.52	0.18	0.59	1.13	0.32	0.48	0.54



University	Variable	Year							Mean
		2014	2015	2016	2017	2018	2019	2020	
WAT	x <sub>1</sub>	44	13	48	45	42	67	40	42.71
	x <sub>2</sub>	2.06	0.83	2.50	2.29	2.26	2.40	1.81	2.02
	x <sub>3</sub>	1.39	1.67	1.08	1.37	1.10	1.11	1.23	1.28
	x <sub>4</sub>	0.00	0.97	0.11	0.07	0.30	1.41	0.04	0.41
UW	x <sub>1</sub>	11	57	52	54	45	60	60	48.43
	x <sub>2</sub>	1.20	2.24	3.83	1.50	2.65	2.61	1.56	2.23
	x <sub>3</sub>	1.38	1.00	1.76	1.48	1.82	1.42	1.69	1.51
	x <sub>4</sub>	0.00	0.00	0.00	0.05	0.12	0.68	0.47	0.19
PP-WI	x <sub>1</sub>	116	98	117	107	133	140	147	122.57
	x <sub>2</sub>	1.31	1.63	1.84	2.08	1.61	1.31	2.12	1.70
	x <sub>3</sub>	1.37	1.22	1.11	1.12	1.28	1.25	1.23	1.23
	x <sub>4</sub>	0.15	0.65	0.36	0.36	0.27	0.63	0.41	0.40
PŁ	x <sub>1</sub>	17	57	65	47	47	63	42	48.29
	x <sub>2</sub>	0.44	0.49	0.70	0.67	0.62	0.98	1.00	0.70
	x <sub>3</sub>	1.32	1.28	1.47	1.37	1.62	1.16	1.30	1.36
	x <sub>4</sub>	0.09	0.17	0.06	0.50	0.34	0.20	0.34	0.24
PW	x <sub>1</sub>	40	13	90	82	115	111	97	78.29
	x <sub>2</sub>	1.93	0.75	1.06	1.00	1.71	1.21	1.79	1.35
	x <sub>3</sub>	1.27	2.26	1.57	1.76	1.43	1.41	1.41	1.59
	x <sub>4</sub>	0.09	0.00	0.32	0.14	0.16	0.26	0.10	0.15
PP – WE	x <sub>1</sub>	45	30	25	25	30	13	14	26.00
	x <sub>2</sub>	1.90	1.87	1.00	3.00	3.58	2.09	2.00	2.21
	x <sub>3</sub>	1.10	0.99	1.08	1.02	1.18	0.92	1.30	1.08
	x <sub>4</sub>	0.48	0.21	0.27	0.48	0.20	1.86	0.00	0.50
UŁ	x <sub>1</sub>	16	24	38	31	36	34	30	29.86
	x <sub>2</sub>	1.77	1.00	3.03	2.89	2.42	1.83	1.60	2.08
	x <sub>3</sub>	1.07	1.26	0.99	0.78	0.91	1.18	0.89	1.01
	x <sub>4</sub>	1.20	0.68	0.63	0.55	0.39	0.75	1.32	0.79
PŚ	x <sub>1</sub>	127	109	121	122	114	118	95	115.14
	x <sub>2</sub>	1.91	1.74	1.87	1.89	1.75	1.82	2.12	1.87
	x <sub>3</sub>	1.03	0.99	1.16	0.98	1.14	1.19	0.96	1.06
	x <sub>4</sub>	0.36	0.58	0.39	0.71	0.82	0.95	0.28	0.58

University	Variable	Year							Mean
		2014	2015	2016	2017	2018	2019	2020	
PKosz.	x <sub>1</sub>	23	13	26	37	35	16	23	24.71
	x <sub>2</sub>	0.94	2.23	1.75	2.62	2.03	2.25	1.50	1.90
	x <sub>3</sub>	1.01	0.85	0.72	0.81	0.99	0.99	1.18	0.94
	x <sub>4</sub>	0.22	1.75	0.96	1.31	0.40	1.52	0.99	1.02
PL	x <sub>1</sub>	68	67	48	84	91	74	58	70.00
	x <sub>2</sub>	1.53	1.66	1.85	1.88	2.23	1.98	3.36	2.07
	x <sub>3</sub>	1.01	1.33	1.07	0.86	0.91	0.93	0.89	1.00
	x <sub>4</sub>	0.56	0.53	0.57	0.39	0.70	1.45	0.93	0.73
WSB	x <sub>1</sub>	17	39	58	38	38	26	20	33.71
	x <sub>2</sub>	0.13	0.45	0.23	0.79	0.71	0.56	0.00	0.41
	x <sub>3</sub>	0.97	1.23	1.15	1.01	0.99	0.74	1.29	1.05
	x <sub>4</sub>	0.32	0.07	0.10	1.40	0.05	1.04	0.00	0.43
SGGW	x <sub>1</sub>	20	17	32	38	15	28	19	24.14
	x <sub>2</sub>	1.83	2.77	1.76	1.17	1.50	1.39	0.64	1.58
	x <sub>3</sub>	0.93	1.14	1.11	1.10	1.42	0.99	1.15	1.12
	x <sub>4</sub>	0.37	2.43	0.46	0.08	0.92	0.45	0.36	0.72
UŚ	x <sub>1</sub>	15	20	33	42	28	49	23	30.00
	x <sub>2</sub>	0.91	2.12	3.04	1.97	2.89	1.21	3.06	2.17
	x <sub>3</sub>	0.87	0.83	0.85	0.94	1.08	0.91	1.01	0.93
	x <sub>4</sub>	0.49	0.32	1.46	1.00	0.54	0.32	1.51	0.81
UWM	x <sub>1</sub>	15	23	20	11	13	13	25	17.14
	x <sub>2</sub>	2.91	1.88	3.00	5.44	2.78	1.10	1.88	2.71
	x <sub>3</sub>	0.87	0.64	0.76	0.44	0.69	0.93	0.72	0.72
	x <sub>4</sub>	0.64	1.99	1.65	4.33	1.16	0.94	1.78	1.78
ZUT	x <sub>1</sub>	37	40	46	39	40	30	32	37.71
	x <sub>2</sub>	2.85	1.48	2.44	2.39	1.00	1.19	3.28	2.09
	x <sub>3</sub>	0.70	0.86	0.88	0.86	0.94	0.87	0.72	0.83
	x <sub>4</sub>	0.64	0.63	0.78	0.82	0.66	0.06	1.15	0.68
PO	x <sub>1</sub>	51	42	39	33	40	40	42	41.00
	x <sub>2</sub>	3.61	3.39	1.78	1.55	2.07	1.97	1.97	2.33
	x <sub>3</sub>	0.66	0.73	0.82	1.09	0.92	0.89	0.85	0.85
	x <sub>4</sub>	1.24	0.93	1.45	0.99	0.78	2.17	2.04	1.37

University	Variable	Year							Mean
		2014	2015	2016	2017	2018	2019	2020	
PRz	$x_1$	10	95	90	104	75	78	39	70.14
	$x_2$	4.00	1.80	2.24	2.23	1.95	2.35	2.35	2.42
	$x_3$	0.52	0.80	1.01	0.91	0.91	0.92	0.93	0.86
	$x_4$	1.71	0.57	0.99	0.48	0.85	1.28	0.65	0.93

Source: own elaboration

Legend:  $x_1$  – number of graduates,  $x_2$  – time of searching for a full-time job (in months),  $x_3$  – Relative Earnings Index,  $x_4$  – Relative Unemployment Index, AGH – AGH University of Science and Technology in Krakow, GUT – Gdańsk University of Technology, UJ-WMiI – Jagiellonian University – Faculty of Mathematics and Computer Science, UJ-WFAiIS – Jagiellonian University – Faculty of Physics, Astronomy and Applied Computer Science, P Wroc. – Wrocław University of Science and Technology, PJATK – Polish-Japanese Academy of Computer Technology, UG – University of Gdańsk, WAT – Military University of Technology, UW – University of Warsaw, PP-WI – Poznań University of Technology – Faculty of Computer Science, PŁ – Łódź University of Technology, PW – Warsaw University of Technology, PP – WE – Poznań University of Technology – Faculty of Electrical Engineering, UŁ – University of Łódź, PŚ – Silesian University of Technology, PKosz. – Koszalin University of Technology, PL – Lublin University of Technology, WSB – WSB University in Dąbrowa Górnicza, SGGW – Warsaw University of Life Sciences, UŚ – University of Silesia, UWM – University of Warmia and Mazury, ZUT – West Pomeranian University of Technology, PO – Opole University of Technology, PRz – Rzeszów University of Technology

When analysing the average values of the synthetic university brand measure, it is notable that the average values of this measure above 0.5 were obtained by the following universities (in order from highest to lowest): PWroc., AGH, PP-WI, PG, PŚ and PW. The order of universities in this ranking is not surprising because it is consistent with the well-known ranking of universities in Poland that provide education in the field of computer science at master's level (Table 3, <https://2021.ranking.perspektywy.pl/ranking/ranking-academic-universities>, accessed: 9 December 2022)

The last five universities in the ranking include PP-WE, the Faculty of Electrical

Engineering of the Poznań University of Technology, which will most likely discontinue its computer science course, as a new Faculty of Computer Science has been established at the same university (already rising as high as third in the rankings of the value of the synthetic brand measure). In addition, the bottom five places also include PJATK, a private university that educates a relatively small number of students (12-34) (Table 2), and three universities that have not yet developed a tradition in education in the field of computer science (second degree), namely PKosz., SGGW and UWM (Table 3).

**Table 3. Synthetic indicator of the university's brand**

University	Synthetic measure of the university's brand							
	2014	2015	2016	2017	2018	2019	2020	Mean
AGH	0.7184	0.7344	0.5711	0.6069	0.4782	0.9862	0.9872	0.7261
PG	0.5671	0.5331	0.9549	0.6742	0.9773	0.5413	0.3999	0.6640
UJ-WMiI	0.4817	0.5709	0.2255	0.2454	0.2681	0.1466	0.1242	0.2946
UJ-WFAiIS	0.4499	0.4256	0.1735	0.1597	0.1812	0.2167	0.0859	0.2418
P Wroc.	0.4411	0.7146	0.9807	0.9759	0.9860	0.9604	0.4381	0.7853
PJATK	0.4455	0.4629	0.0190	0.0523	0.0385	0.0206	0.0954	0.1621
UG	0.4511	0.3483	0.1662	0.1229	0.1312	0.0577	0.1055	0.1976
WAT	0.4755	0.4287	0.2709	0.2086	0.2103	0.3441	0.1240	0.2946
UW	0.4202	0.4483	0.3015	0.2637	0.2322	0.2995	0.2191	0.3121
PP-WI	0.7792	0.5879	0.7889	0.5886	0.8689	0.8087	0.6333	0.7222
PL	0.4529	0.5497	0.3983	0.2208	0.2464	0.3184	0.1334	0.3314
PW	0.4514	0.5237	0.5862	0.4354	0.7389	0.6241	0.3953	0.5364
PP – WE	0.4239	0.3875	0.0979	0.0863	0.1243	0.0124	0.0089	0.1631
UŁ	0.2841	0.4144	0.1963	0.1229	0.1669	0.1339	0.0767	0.1993
PŚ	0.7070	0.5823	0.8189	0.6805	0.7317	0.6687	0.3858	0.6536
PKosz.	0.4184	0.1921	0.1059	0.1597	0.1596	0.0226	0.0436	0.1574
PL	0.5212	0.5103	0.2708	0.4477	0.5652	0.3886	0.2099	0.4163
WSB	0.4315	0.5041	0.3457	0.1657	0.1811	0.0829	0.0287	0.2485
SGGW	0.3503	0.1603	0.1507	0.1656	0.0171	0.0957	0.0241	0.1377
UŚ	0.3739	0.3378	0.1592	0.1902	0.1095	0.2293	0.0453	0.2065
UWM	0.2526	0.2089	0.0639	0.0255	0.0149	0.0054	0.0535	0.0892
ZUT	0.3016	0.3865	0.2559	0.1719	0.1957	0.1083	0.0869	0.2153
PO	0.2670	0.2666	0.2034	0.1351	0.1959	0.1724	0.1339	0.1963
PRz	0.0000	0.5185	0.5864	0.5703	0.4493	0.4141	0.1195	0.3797

Source: own elaboration

Key: AGH – AGH University of Science and Technology in Krakow, GUT – Gdańsk University of Technology, UJ-WMiI – Jagiellonian University – Faculty of Mathematics and Computer Science, UJ-WFAiIS – Jagiellonian University – Faculty of Physics, Astronomy and Applied Computer Science, P Wroc. – Wrocław University of Science and Technology, PJATK – Polish-Japanese Academy of Computer Technology, UG – University of Gdańsk, WAT – Military University of Technology, UW – University of Warsaw, PP-WI – Poznań University of Technology – Faculty of Computer Science, PŁ – Łódź University of Technology, PW – Warsaw University of Technology, PP – WE – Poznań University of Technology – Faculty of Electrical Engineering, UŁ – University of Łódź, PŚ – Silesian

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## Conclusions

This paper reviews the literature on many factors determining the value of a university's brand. Some of these factors can only be determined on the basis of questions addressed to stakeholders (external and internal). Therefore, the authors of the article are aware that the synthetic measure of a university's brand presented herein merely represents an attempt to indicate the direction of further research leading to the determination of a university's brand.

The method presented may be used as an auxiliary measure to determine the value of a university's brand. The small number of selected variables used to determine the synthetic measure of the value of a university's brand may raise objections; however, the advantage of these variables is their unquestionable value. Usually, the brand is determined on the basis of surveys, which by their nature are less accurate, due to the differing views of respondents on the brand being assessed.

The results obtained may be used as a guideline for the use of a larger spectrum of variables to determine a university's brand. In further research, the number of variables providing unquestionable values (often referred to as hard) should certainly be increased and the synthetic measure of a university's brand should be enriched with data obtained from surveys of both internal and external stakeholders.

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