



INTERNATIONAL SCIENTIFIC CONFERENCE ON ECONOMIC
DEVELOPMENT AND LEGACY OF SIMON KUZNETS

Computer-mathematical modeling of the attractiveness of the higher education system

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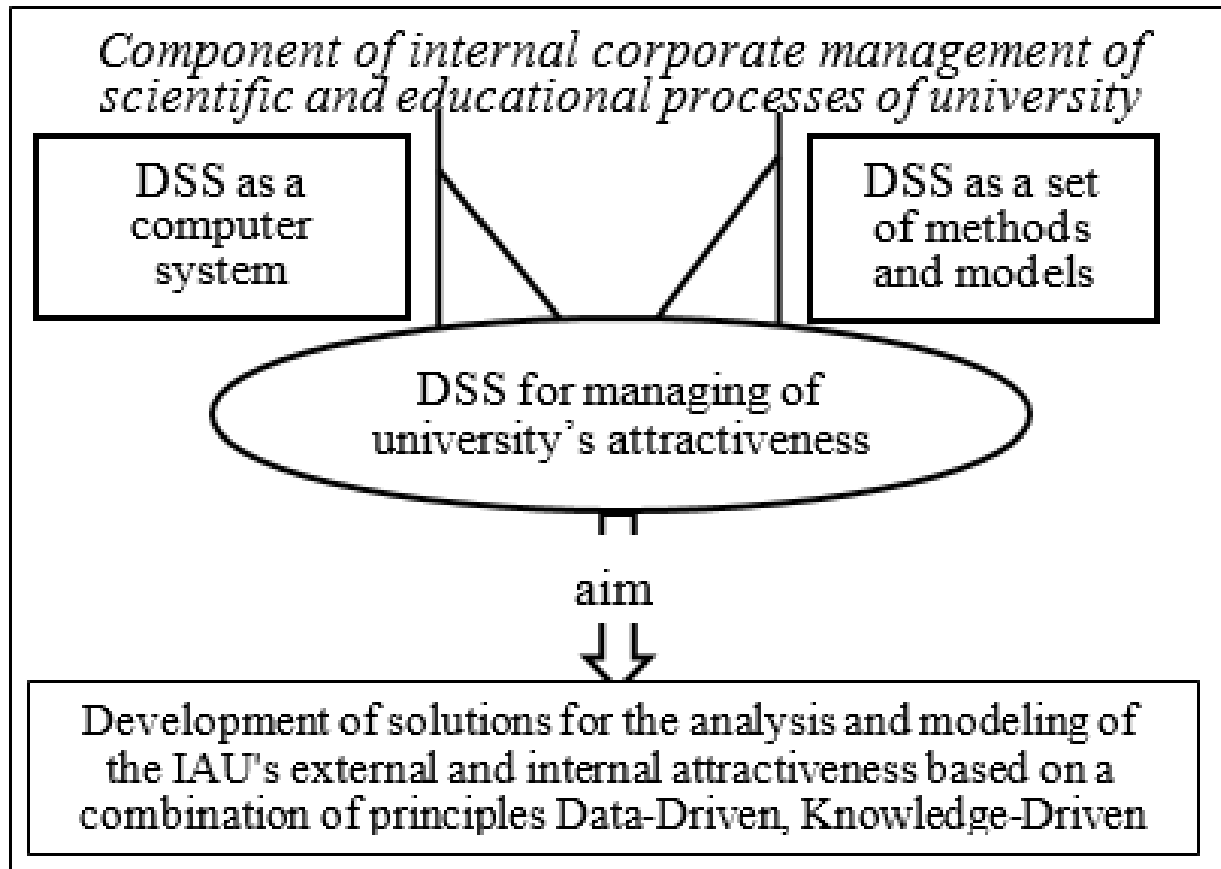
The purpose of the article is to develop a set of models for assessing and forecasting the external and internal attractiveness of the country's higher education system for making decisions on managing the attractiveness of the university.

Theoretical and methodological basis of the study

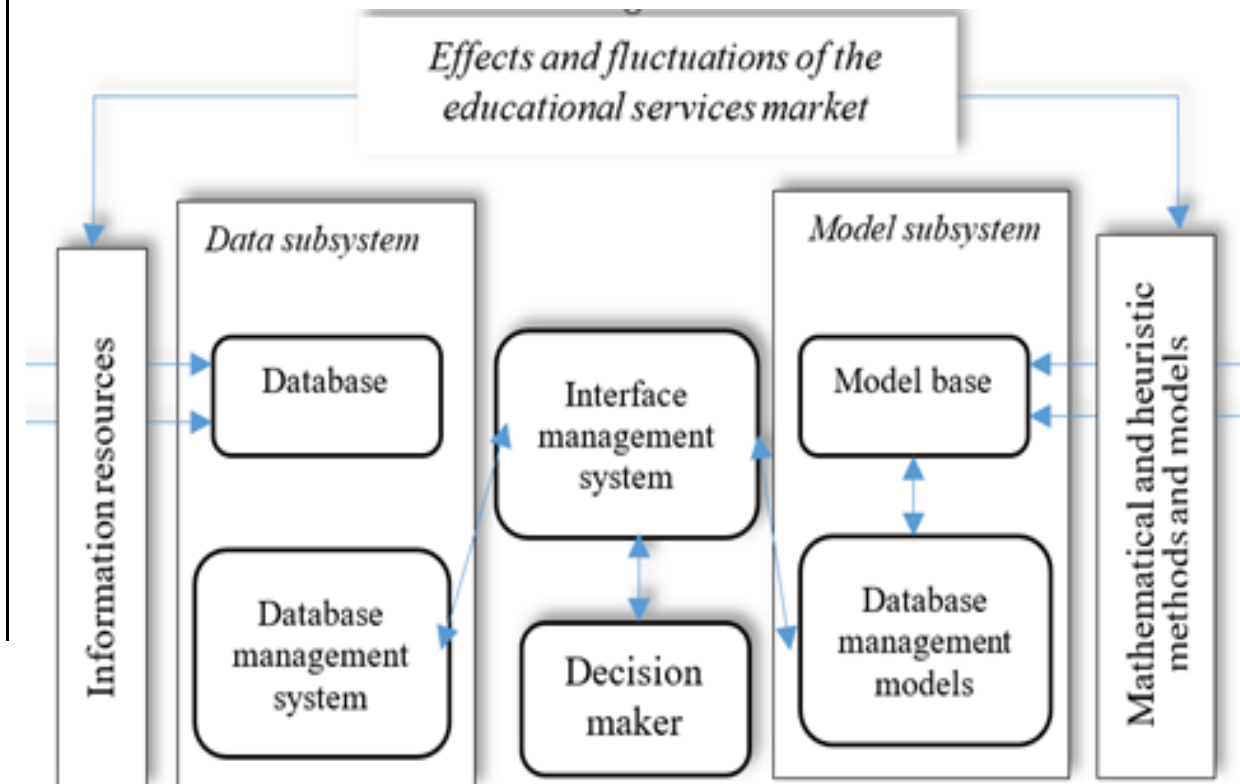
Hypothesis 1. The attractiveness of the country's HES is a synergistic effect of the attractiveness of higher education institutions (HEIs) and depends on the creation of a favorable environment for the innovative development of universities and their readiness for change;

Hypothesis 2. Transformational effects and modern trends in the development of the global and national HES require the development and use of relevant models, permanent updating of the database of DSS models, which will allow developing tactics and strategies for managing the university's attractiveness for national and international applicants

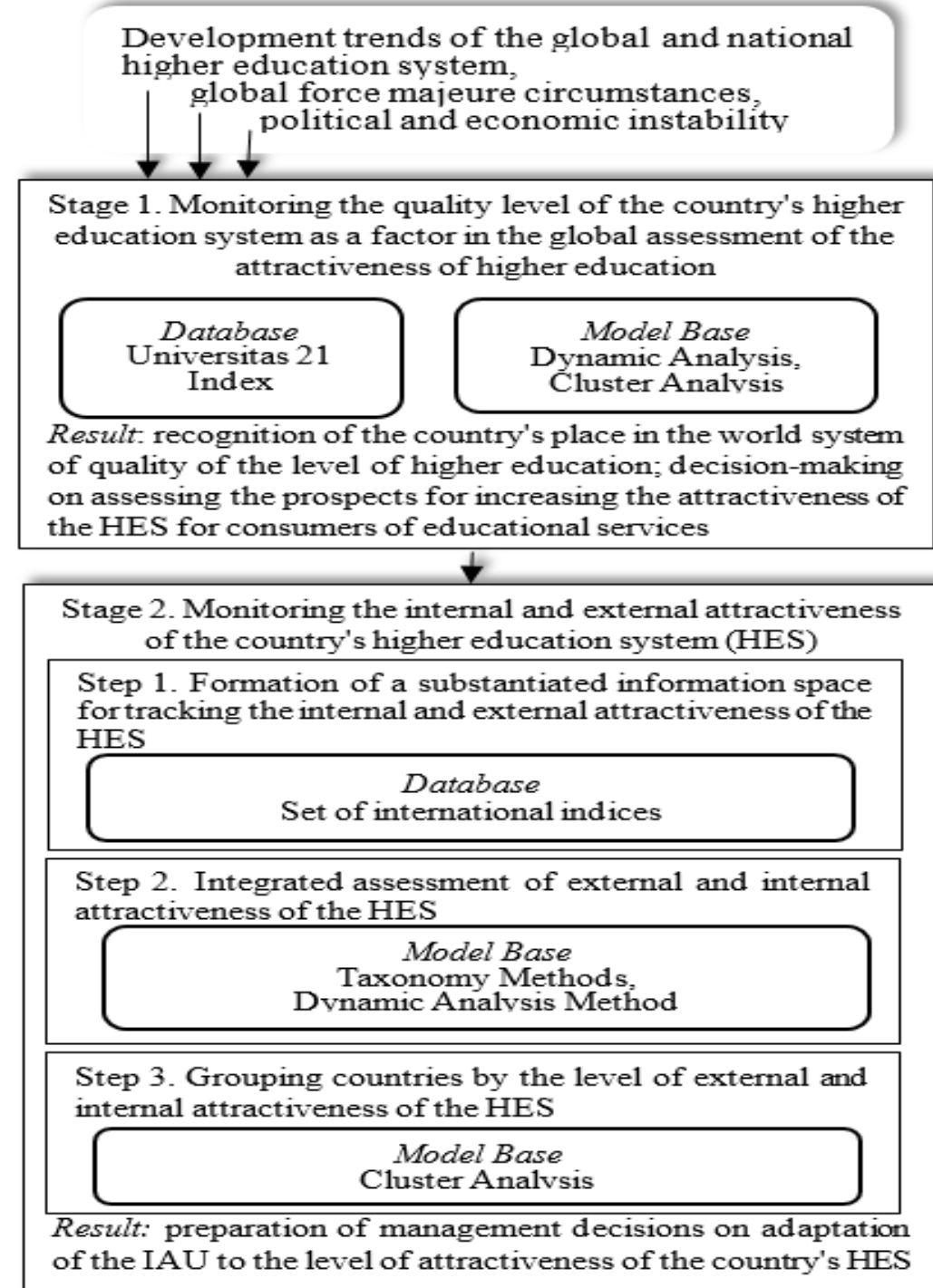
DSS as a component of internal corporate management of scientific and educational processes of university



Structure of the DSS for managing university's attractiveness

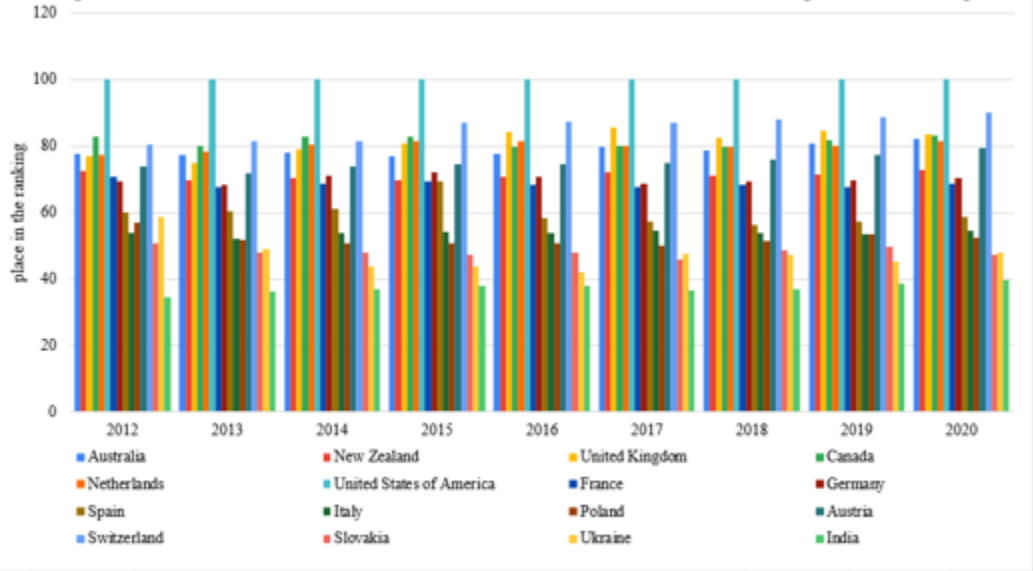


Scheme of conceptual research model



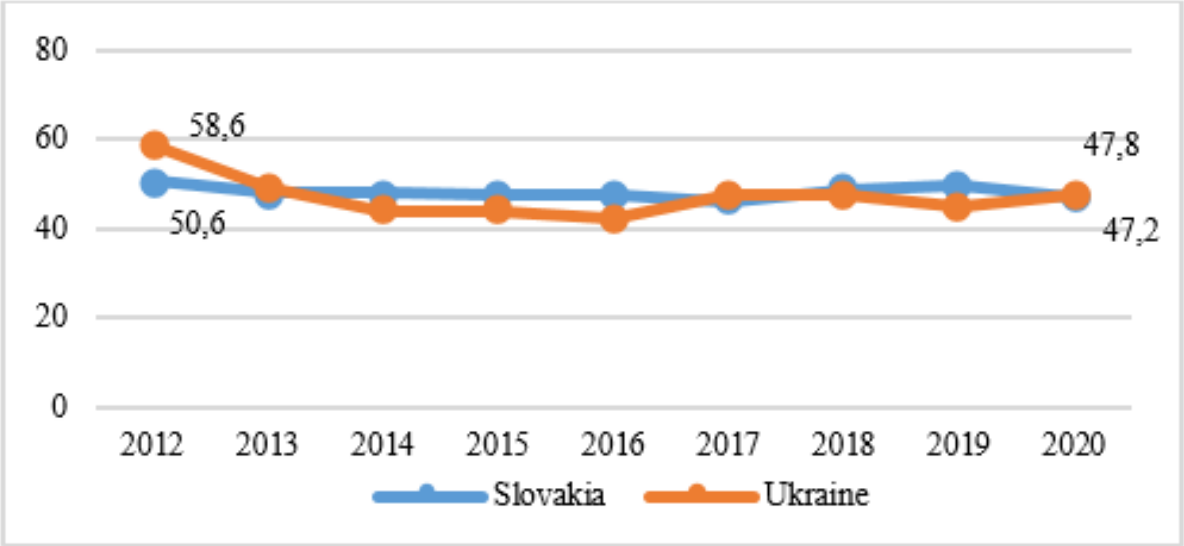
Stage 1. Monitoring the quality level of the country's higher education system as a factor in the global assessment of the attractiveness of higher education

Dynamics of the Universitas 21 index by country

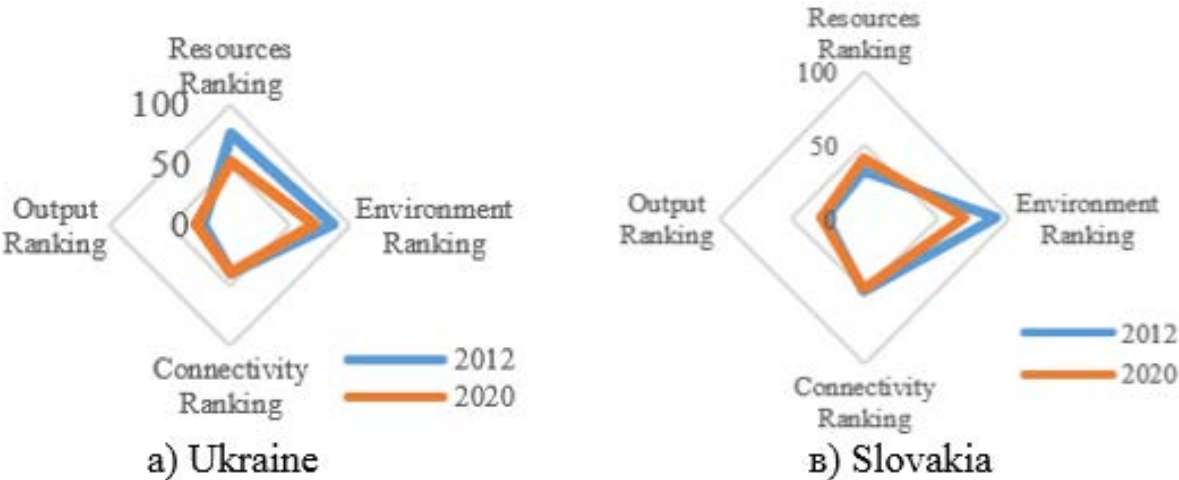


*2020 is the latest actual data

Trends in the quality level of the HES of Ukraine and Slovakia



U21 Index Component Rating Diagram



Stage 1. Monitoring the quality level of the country's higher education system as a factor in the global assessment of the attractiveness of higher education

Model type and its quality criteria (Slovakia)

Model name	Years	Predictive value	MAPE
Exponential smoothing without trend and seasonal components	2021	48.11	2.10
	2022	48.10	1.89
	2023	48.08	1.72
	2024	48.11	1.58

Global talent competitiveness index values

Years	2020	2021	2022	2023	2024
Ukraine	41.47	47.42	40.56	44.8	44.8

Clustering of countries by the level of higher education quality for the period 2012-2020

Cluster's number	Characteristics of cluster groups		
	Countries	Interpretation of cluster	Indicator value
1	UK, Canada, Netherlands, USA, Switzerland	Countries with high levels of education quality	[80 ÷ 100]
2	Australia, New Zealand, France, Germany, Spain, Austria	Countries with average education quality	[58.6 ÷ 79.3]
3	Italy, Poland, Slovakia, Ukraine, India	Countries with below average education quality	[34.4 ÷ 58.6]

Stage 2. Monitoring the internal and external attractiveness of the country's higher education system

Integrated assessment of external and internal attractiveness of the HES

Assessment of the internal attractiveness of the country's HES

$$I_{internal} = < GTCI; EI; CLI; LPP; S >$$

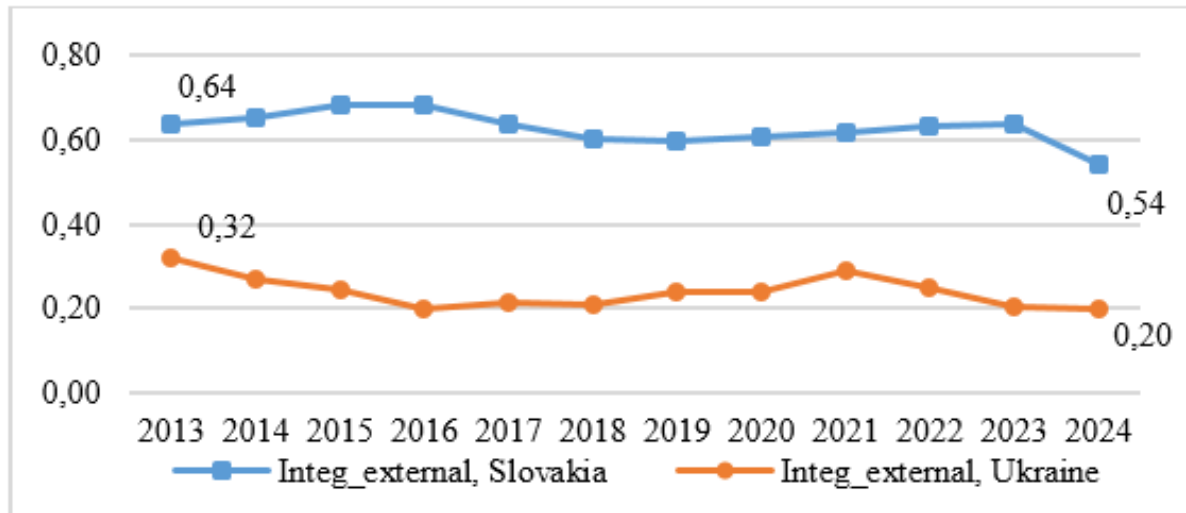
Assessment of the external attractiveness of the country's HES

$$I_{external} = < GTCI; GPI; HDI; Sm >$$

Assessment of the total attractiveness of the country's HES

$$I_{total} = < GTCI; EI; CLI; LPP; S; GPI; HDI; Sm >$$

Dynamics of integrated indicators of external attractiveness of the HES of Ukraine and Slovakia



Integral indicators of assessment of external attractiveness of the country's HES for 2013-2024 (fragment)

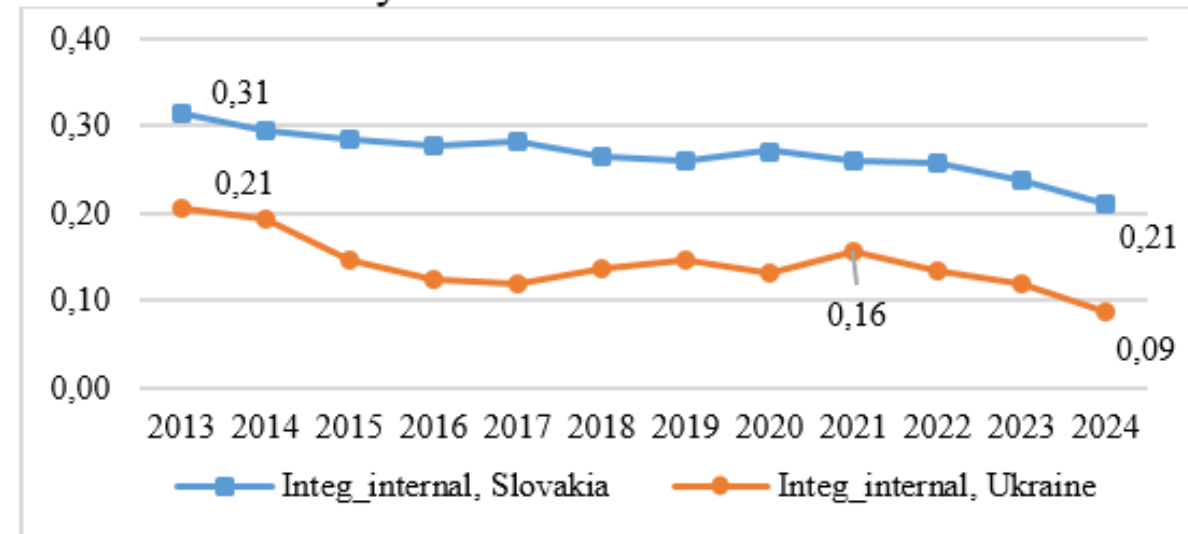
Country	2013	2014	2018	2023	2024
Australia	0.838	0.869	0.878	0.891	0.755
New Zealand	0.850	0.845	0.898	0.855	0.700
UK	0.764	0.769	0.777	0.858	0.739
Canada	0.870	0.910	0.863	0.878	0.723
Netherlands	0.856	0.848	0.856	0.906	0.763
USA	0.639	0.670	0.665	0.617	0.545
France	0.672	0.687	0.695	0.721	0.629
Germany	0.841	0.845	0.829	0.875	0.720
Spain	0.636	0.673	0.666	0.737	0.623
Italy	0.616	0.633	0.610	0.708	0.596
Poland	0.647	0.639	0.599	0.656	0.553
Austria	0.853	0.844	0.851	0.864	0.712
Switzerland	0.986	0.980	0.936	0.979	0.991
Slovakia	0.640	0.651	0.603	0.638	0.542
Ukraine	0.320	0.272	0.209	0.204	0.199
India	0.059	0.081	0.147	0.138	0.147

Stage 2. Monitoring the internal and external attractiveness of the country's higher education system

Integral indicators of assessment of internal attractiveness of the country's HES for 2013-2024 (fragment)

Country	2013	2014	2018	2023	2024
Australia	0.336	0.379	0.387	0.362	0.348
New Zealand	0.337	0.341	0.354	0.328	0.325
UK	0.413	0.397	0.417	0.406	0.377
Canada	0.430	0.430	0.410	0.370	0.324
Netherlands	0.395	0.383	0.375	0.370	0.375
USA	0.722	0.699	0.635	0.527	0.460
France	0.395	0.350	0.335	0.318	0.305
Germany	0.471	0.453	0.428	0.410	0.385
Spain	0.343	0.340	0.345	0.340	0.309
Italy	0.301	0.286	0.295	0.261	0.236
Poland	0.342	0.334	0.315	0.290	0.265
Austria	0.385	0.379	0.346	0.329	0.305
Switzerland	0.290	0.266	0.204	0.182	0.223
Slovakia	0.315	0.294	0.265	0.238	0.211
Ukraine	0.206	0.194	0.136	0.119	0.088
India	0.176	0.178	0.212	0.155	0.125

Dynamics of integrated indicators of internal attractiveness of the HES of Ukraine and Slovakia

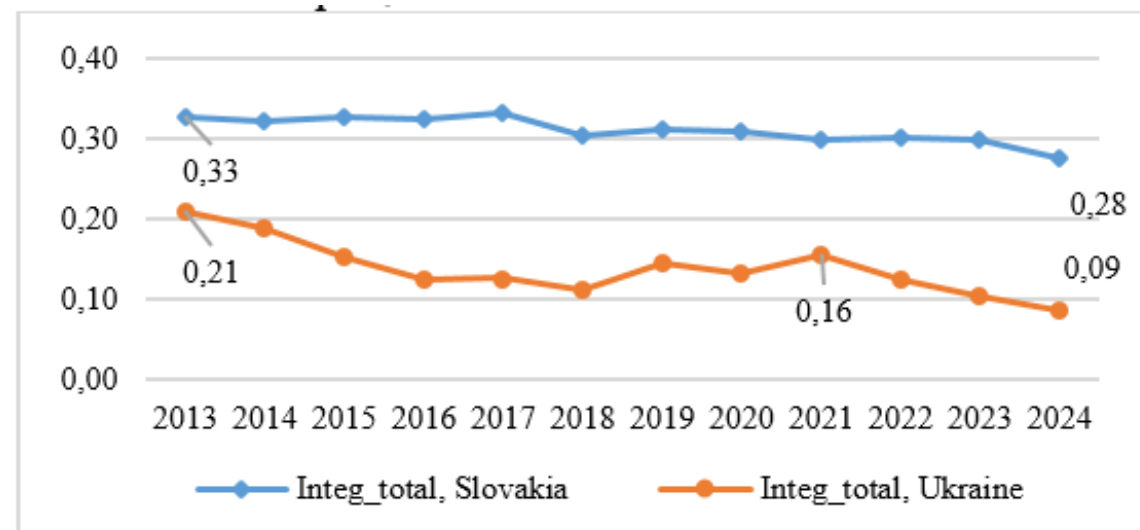


Stage 2. Monitoring the internal and external attractiveness of the country's higher education system

Integral indicators of the assessment of the overall attractiveness of the country's HES for the period 2013-2024 (fragment)

Country	2013	2014	2018	2023	2024
Australia	0.420	0.451	0.487	0.475	0.456
New Zealand	0.368	0.375	0.382	0.374	0.368
UK	0.489	0.479	0.489	0.528	0.496
Canada	0.458	0.461	0.457	0.462	0.422
Netherlands	0.408	0.403	0.404	0.428	0.427
USA	0.676	0.678	0.638	0.552	0.508
France	0.428	0.406	0.390	0.391	0.377
Germany	0.495	0.486	0.485	0.472	0.450
Spain	0.366	0.366	0.370	0.388	0.366
Italy	0.343	0.336	0.344	0.337	0.316
Poland	0.355	0.354	0.342	0.350	0.328
Austria	0.405	0.402	0.382	0.385	0.365
Switzerland	0.341	0.328	0.291	0.287	0.307
Slovakia	0.327	0.323	0.304	0.298	0.276
Ukraine	0.209	0.189	0.112	0.104	0.086
India	0.083	0.103	0.135	0.135	0.124

Dynamics of integrated indicators of the overall attractiveness of the HES of Ukraine and Slovakia

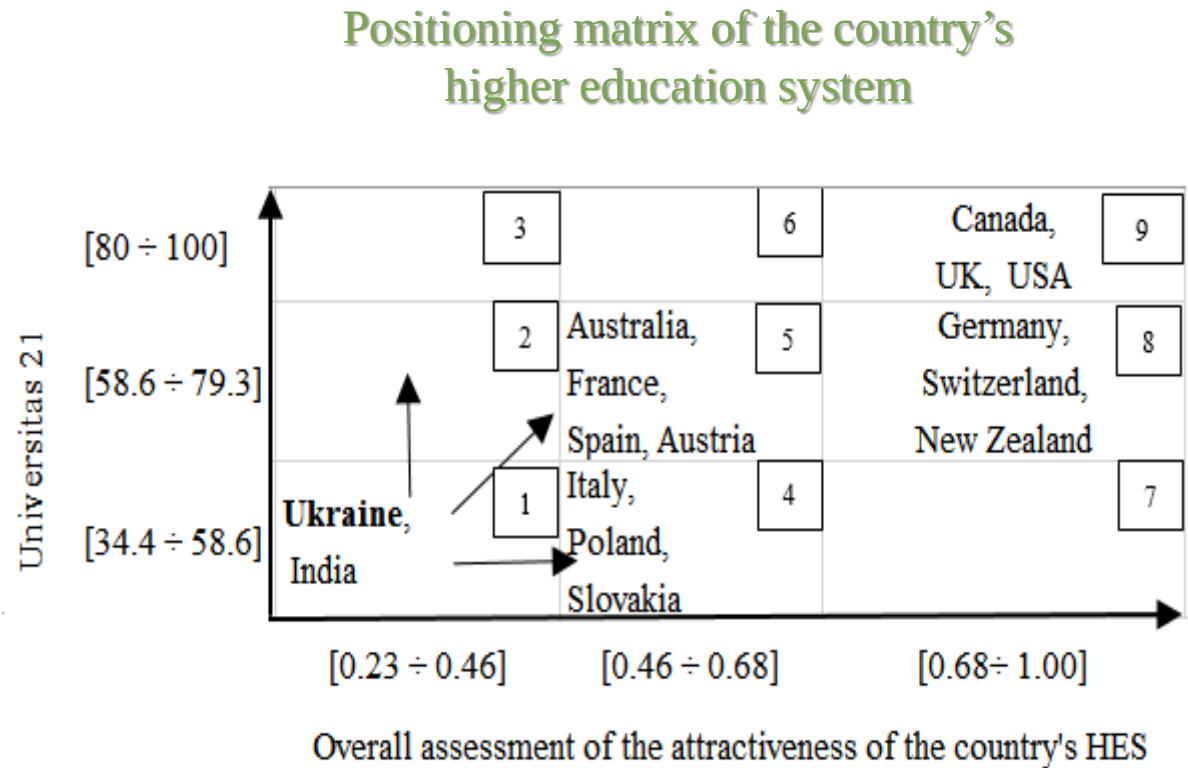


Stage 2. Monitoring the internal and external attractiveness of the country's higher education system

Grouping countries by the level of external and internal attractiveness of the HES

CLUSTERING OF COUNTRIES BY THE LEVEL OF ATTRACTIVENESS OF HIGHER EDUCATION SYSTEMS FOR THE PERIOD 2013-2024

Cluster's number	Countries	Indicator value
1	Canada, UK, USA, Germany	$[0.68 \div 1.00]$
2	Austria, Switzerland, Italy, Poland, Netherlands, Australia, New Zealand, France, Spain, Slovakia	$[0.46 \div 0.68]$
3	Ukraine, India	$[0.23 \div 0.46]$



Conclusion

1. Analysis of the factors of attractiveness of the HES of the countries allowed us to conclude that it depends both on the innovative and active efforts and resource readiness of universities for changes, and on the efforts of the government to create a favorable legal environment, an effective infrastructure for the development of higher education and the socio-economic stability of the state.
2. The diversity of factors influencing the activities of universities, the stochastic nature of their influence, requires a permanent update of the DSS for managing the attractiveness of universities, which, as a result, increases the attractiveness of the entire HES of the country. Monitoring and modeling the external environment of the university, namely, the attractiveness of the HES of the country, is a necessary condition for making adequate management decisions, forming competitive advantages, realizing opportunities, and localizing the consequences of the negative impact of the external environment.
3. The analysis of the Universitas 21 index and its trends for Ukraine and Slovakia was conducted. The analysis of the index components allowed us to conclude that the environment created by the state, stimulating the development of academic autonomy, has a strong positive impact on the quality of HES; the weak points of HES are the results of university research and their impact on the development of the country, the employment of graduates, and the main publication results of teachers. The country clustering model allowed us to diagnose the position of Ukraine and Slovakia in the cluster of countries with a below-average quality of higher education.

Conclusion

4. The analysis of the index components allowed us to conclude that the environment created by the state, stimulating the development of academic autonomy, has a strong positive impact on the quality of HES; the weak points of HES are the results of university research and their impact on the development of the country, the employment of graduates, and the main publication results of teachers. The country clustering model allowed us to diagnose the position of Ukraine and Slovakia in the cluster of countries with a below-average quality of higher education. .
- 5 A positioning matrix has been developed that allows not only to diagnose the positions of universities, but also to develop various transition scenarios to increase the attractiveness of higher education. At the same time, the indicators of higher education institutions of countries with stronger positions can be considered as benchmarks for future development. Recommendations have been developed to increase the attractiveness of Ukrainian higher education institutions.

Thus, the proposed model for assessing and modeling the attractiveness of the country's higher education institutions serves as a tool for making adequate decisions on managing the attractiveness of an individual university based on careful monitoring of processes in the national and global higher education markets.

Thank you for attention

