PEST- and SWOT-analysis of university internationalization factors

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Abstract. This article deals with PEST and SWOT analysis of factors characterizing the university’s international activities. Environmental factors were identified that have an impact on the functioning and future development of the educational institution, including the international activities of the university. External and internal factors that affect the international activities of universities have been identified by SWOT analysis. These results will be used to build up a cognitive map of the international activities of the university

1. Introduction
The most important trends in the reform of national education systems in most developed countries are the internationalization of the education system and the integration of the educational space.

The forms of international cooperation that are inextricably linked with the internationalization of education include:
- integration of international educational standards into national curricula;
- international mobility;
- formation of uniform international standards, comparable criteria and methodologies in ensuring the quality of educational programs;
- inter-institutional cooperation, the formation of mobility schemes based on joint training and research programs;

Within the implementation of the project 573879-EPP-1-2016-1-FR-EPPKA2-CBHE-JP INternationaliSation of master Programs In Russian and China in electrical engineering the issue on determining the environmental factors affecting the functioning and future development of an educational institution, including the international activities of the university was considered. However, there is a significant difficulty in analyzing the international activities of the university and making management decisions due to the multidimensionality and their interconnectedness, due to the complexity of studying individual phenomena and the lack of sufficient quantitative information about the dynamics of processes. Thus, the construction of cognitive maps and models for the analysis of international activities of the university is the optimal solution for the development of the management decisions.
2. Methods
At the initial stage of building a cognitive map, it is important to identify the important factors that influence and determine the situation under study. In the works [5, 6, 7] devoted to the use of models based on cognitive maps for the study of semistructured object it is noted that four approaches are used to construct maps:

1. Identification of factors and relationships through content analysis of documents;
2. Identification of factors and relationships based on conceptual schemes (usually, PEST analysis and / or SWOT analysis).
3. Identification of factors and relationships through the analysis of expert knowledge;
4. Identification of factors and relationships through the analysis of quantitative data, for example, regression analysis or time series of semistructured parameters;

In this paper, approaches 1-2 will be considered.

The process of formalization of knowledge about the studied semistructured system is an important step in the conceptual (primary) structuring of knowledge. The conceptual structuring of knowledge is aimed at limiting the subject area under consideration in the framework of the goals of analyzing the situation and forming a unified conceptual system for the participants in this process - a heterogeneous team of experts. The use of conceptual schemes allows to systematize the process of building a cognitive map [8]. We use the widely used conceptual schemes for structuring knowledge about the development of a complex object - PEST-analysis and SWOT-analysis.

PEST analysis.

It is a tool designed to identify political (Policy), economic (Economy), social (Society) and technological (Technology) environmental factors affecting the operation and development prospects of an educational institution, including international activities. [9-11]. When studying various components of a university's macro-environment, it is very important to consider that all components are in a state of strong interaction. A change in one of the components necessarily leads to a change in other components. Research and analysis must be carried out systematically with tracking not only changes in a separate component, but also considering how these changes will affect other components. It is also necessary to consider the fact that the degree of impact of individual components of the macro-environment on different firms is different, that it manifests itself differently depending on the size of the university, industry focus, territorial location, etc.

As an analytical tool, the PEST-analysis contains the ability to form an objective view of the real state of the internationalization degree of the university and assess its development prospects and directions for improvement in the context of the external environment and the impact of the most important influencing factors. The results of PEST analysis of university international activities factors are presented in Table 1.

| Factors | General conclusion about the influence of the environment on the object of study |
|---------|--------------------------------------------------------------------------------|
| P1: Currency exchange rate | The weakening of the Russian ruble leads to an increase in the attractiveness of obtaining a Russian... |
| P2: Number of foreign students from CIS countries |  |
| P3: Number of foreign students (except CIS countries) |  |
### Factors

|   | General conclusion about the influence of the environment on the object of study |
|---|--------------------------------------------------------------------------------|
| $P_4$ | Number of bilateral and multilateral agreements with foreign organizations |
| $P_5$ | Number of joint international projects financed by grants from the EU and other funds (Erasmus +, Horizon, etc.) |
| $P_6$ | Number of foreign students received scholarship for credit mobility for one semester in the educational organization (incoming student mobility) |
| $P_7$ | Number of students received scholarship for credit mobility for one semester in the foreign educational |

### Economic environment (E)

|   | Strengthening the economic situation in the country, namely |
|---|-------------------------------------------------------------|
| $P_8$ | Total net income |
| $P_9$ | GDP level |
| $P_{10}$ | GDP level per capita |
| $P_{11}$ | Unemployment rate in the country |
| $P_{12}$ | Average cost of education fees in the country |
| $P_{13}$ | Average living cost in the country |
| $P_{14}$ | Budget for international activities of the university |

### Social environment (S)

|   | Currently, there is an increase in the number of foreign students and graduate students from the CIS countries and far abroad, which naturally has a positive effect on the international activities of universities |
|---|---------------------------------------------------------------------------------------------------------------------------------|
| $P_{15}$ | Population size in the country |
| $P_{16}$ | Population size aged 15-24 in the country |
| $P_{17}$ | Number of foreign students from CIS countries |
| $P_{18}$ | Number of foreign students (except CIS countries) |
| $P_{19}$ | Number of international associations and organization education institution participate |
| $P_{20}$ | Number of courses taught in English |
| $P_{21}$ | Number of educational programs taught in English |
| $P_{22}$ | Number of foreign postgraduate students from CIS countries |
| $P_{23}$ | Number of foreign postgraduate students (except CIS countries) |

### Technological environment (T)

|   | The tendency of growth of any factor of the technological environment will lead to a rapid development of the international activities of the university. |
|---|---------------------------------------------------------------------------------------------------------------------------------|
| $P_{24}$ | Number of employed people in educational area |
| $P_{25}$ | Position in international ranking (QS, THE, or others) |
| $P_{26}$ | Number of double degree programs with foreign partner institution |
| $P_{27}$ | Number of professors, teachers and researchers received a master's degree, or PhD, or others in foreign educational and scientific organizations |
Factors | General conclusion about the influence of the environment on the object of study
--- | ---
$P_{28}$ Number of professors, teachers and researchers working in an educational organization abroad for at least 1 month (outgoing academic mobility) |  
$P_{29}$ Number of foreign professors, teachers and researchers working in an educational organization for at least 1 month (incoming academic mobility) |  
$P_{30}$ Number of educational programs developed and implemented in partnership with leading foreign universities |  
$P_{31}$ Number of publications in international rating journals (QI-QIV) |  
$P_{32}$ Number of students received a double diploma in the educational program, implemented in partnership with leading foreign universities |  

**SWOT analysis.** One of the widely used conceptual schemes used to structure knowledge about the development of a semistructured object is SWOT analysis. The analysis of this type is aimed at identifying external and internal factors that affect the international activities of universities. According to the results of the application of the scheme, strategic alternatives are formulated, which serve as the basis for the formation of scenarios for modeling the development of a situation based on a cognitive map [12–15]. The result of the SWOT analysis of the internationalization of universities is shown in Table 2.

**Table 2. SWOT-analysis of university international activities factors**

| Strengths (S) |  |
| --- | --- |
| S$_1$ | Geographical location of the university |
| S$_2$ | Variety of educational programs |
| S$_3$ | Research reputation |
| S$_4$ | Infrastructure (dormitories, sports complexes) |
| S$_5$ | Level of electronic equipment of the university, the use of electronic documents |
| S$_6$ | Number of foreign students |
| S$_7$ | Number of educational programs in English |
| S$_8$ | Active participation in international consortia, projects and grants |

| Weaknesses (W) |  |
| --- | --- |
| W$_1$ | Average age of faculty |
| W$_2$ | Quality of university administration |
| W$_3$ | Financial solvency of the university, financial policy in relation to internationalization |

| Opportunities (O) |  |
| --- | --- |
| O$_1$ | Expanding the global focus / partnership - opportunities for new perspectives, programs and partnerships |
| O$_2$ | Position of the university in international rankings of universities |
| O$_3$ | Collaboration with international institutions, organizations, agencies |
| O$_4$ | Fund-raising of national and foreign grant financing |
3. Conclusion

As a result of the project 573879-EPP-1-2016-1-FR-EPPKA2-CBHE-JP and international research and study, PEST and SWOT analysis of factors characterizing the international activities of universities were conducted. These results will be used to build a cognitive map of the international activities of the university. With the help of the developed cognitive map, the following management tasks can be solved in the future:
- forecast of situation self-development, i.e. study of the dynamics of changes in the values of factors in the absence of control;
- forecast of the situation development in case of fixed control (a direct task is the analysis of various scenarios with control variation);
- finding a control that provides the implementation of the required or desired scenario (inverse problem).

Acknowledgment

The results of the study have been obtained within the support of grant 573879-EPP-1-2016-1-FR-EPPKA2-CBHE-JP Internationalisation of master Programs in Russian and China in electrical engineering. This project has been funded with support from the European Comission. This publication reflects the views only of the author, and the Comission cannot be held responsible for any use which may be made of the information contained therein.

References

[1] Doiz A, Lasagabaster D and Sierra J 2013 Globalisation, internationalisation, multilingualism and linguistic strains in higher education J. Studies in Higher Education pp 1407-21
[2] Middlehurst R 2014 Higher education research agendas for the coming decade: a UK perspective on the policy–research nexus J. Studies in Higher Education pp 1475-87
[3] Soliman S, Anchor J and Taylor D 2018 The international strategies of universities: deliberate or emergent? J. Studies in Higher Education. DOI:10.1080/03075079.2018.1445985
[4] Gorbushin D, Grinchenkov D, Kolomiets A and Phuc Hau N 2017 Automated intellectual analysis of consumers' opinions in the scope of internet marketing and management of the international activity in educational institution Proc. of the 5th Int. Conf. on Applied Innovations in IT (16 March 2017, Kothen) pp 57-63
[5] Kuzilek, J. et al. Open University Learning Analytics dataset. Sci. Data 4:170171, 2017. DOI:10.1038/sdata.2017.171
[6] Adelson Jill L 2013 Educational Research with Real-World Data: Reducing Selection Bias with Propensity Score Analysis. J. Practical Assessment, Research & Evaluation 18(15).
[7] Grinchenkov D, Kushchiy D and Kolomiets A 2016 One Approach to the problem solution of specialized software development for subject search Proc. of the 4th Int. Conf. on Applied Innovations in IT ed.: Eduard Siemens, Bernd Krause, Leonid Mylnikov (10 March 2016, Kothen) pp 39-48
[8] Winitzky-Stephens J and Pickavance J 2017 Open Educational Resources and Student Course Outcomes: A Multilevel Analysis J. International Review of Research in Open and Distributed Learning, 18(4). DOI:10.19173/irrodl.v18i4.3118
[9] Ivanchenko A, Kolomiets A, Grinchenkov D and Nguyen V N 2016 Optimization of the modular educational program structure Proc. of the 4th Int. Conf. on Applied Innovations in IT ed.: Eduard Siemens, Bernd Krause, Leonid Mylnikov (10 March 2016, Kothen) pp 31-34
[10] Warwick P, Moogan Y 2013 A comparative study of perceptions of internationalisation strategies in UK universities J. of Comparative and International Education pp 102-23

[11] Zhou S, Liu L, Wang Z and He Y 2016 Research on Conceptual Frame and Implementation Issues of Internationalization of Engineering Course in Chinese Universities International Journal of Information and Education Technology pp 308-13.

[12] Grinchenkov D, Kushchiy D and Kolomiets A 2016 One approach to the solution of subject search problem of electronic educational resources on the Internet 2nd Int.Conf. on Industrial Engineering, Applications and Manufacturing, ICIEAM 2016 (Chelyabinsk, 20 May 2016) pp 791-1704.

[13] Raby R 2010 Comparative and International Education: A Bibliography. Comparative Education Review 54:S1 pp S1-S132

[14] Sawir E 2013 Internationalisation of higher education curriculum: the contribution of international students J. Globalisation, Societies and Education pp 359-78

[15] Keys P 2006 On becoming expert in the use of problem structuring methods J. of the Operational Research Society pp 822-29