Article

Capacity Building for Internationalization at a Technical University in Kazakhstan

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Abstract: This article discusses the internationalization capacity building project at the Karaganda Technical University ('KTU') in Kazakhstan. The project, entitled "Capacity building for the internationalization of a technical university by means of digital learning technologies," was supported by the fund "Scientific foundations "Mangilik el" (education of the 21st century, fundamental and applied research in the humanities)" for scientists 2020–2022. The project's primary purpose was to explicate a sustainable strategy for internationalizing a Kazakh technical university, considering the national and international contexts, evaluating internationalization capacity needs, formulating and implementing a capacity-building response for internationalization, and enhancing the qualifications and abilities of students and teachers to an internationally comparable level. In addition, the project delivers a set of strategies for internationalization and a benchmarking methodology for evaluating the effectiveness of internationalization processes. The benchmarking analysis of the internationalization process of a university has been conducted through a classification method, comparative analysis, multi-factor SWOT analysis, and correlation analysis.

Keywords: internationalization; capacity building; technical university; benchmarking; SWOT analysis; Kazakhstan higher education

1. Introduction

In recent years, the internationalization of Kazakhstan's universities has been widely discussed by local higher education leaders and policymakers. As understood in Kazakhstan, internationalization creates opportunities for higher education institutions by increasing accessibility to international partnerships, improving research impact, and introducing innovative teaching and learning. Consultations and policy work lead Kazakhstan's universities to be committed to participating in global rankings and otherwise engage in internationalizing. Besides, it is understood in local higher education that internationalization creates pathways for improvements in the quality of education in general. In addition, a university's internationalization might consist of recruitment of international students, engagement of foreign teachers, international internships, student exchanges, international research projects, participation in and organization of international conferences, securing grants from international agencies, and the representation of a university in the networked digital space.

Government programs and norms essentially drive internationalization activities in Kazakhstan. The central policy that develops the trends in Kazakh universities is the State Program of Educational Development for 2020–2025. The first aim of this program is to increase the global competitiveness of the national education and science, and the education and training of individuals. The main categories of internationalization that must

be developed per this plan include: three Kazakh universities entering the top QS WUR 200, recruiting international students to make up 10% of the student population, opening of branches of campuses locally and regionally, increasing the number of international scholars, and engaging in academic exchange activities. Refs. [1,2] Academic mobility appears to prevail in the internationalization of higher education locally.

Along with the above-stated aims of the state program, developing a Central Asian educational hub is a priority. In this regard, various initiatives have been started on the governmental level: the Study in Kazakhstan project (an online platform for attracting international students), the opening of international branch campuses in Kazakhstan, and the Kazakhstan Education Day Fairs Abroad. The rationale behind this conceptual framework is a primarily social one.

A comparison of internationalization at the governmental level with the internationalization of higher education in Malaysia was found useful for understanding Kazakhstan's status. Like Kazakhstan, Malaysia was targeted to be a regional hub for higher education, but now Malaysia aims at becoming a world educational hub. The imperatives of the internationalization of higher education in Malaysia are recorded in the state's plans [3]. The regional educational hub's development was sustained, starting from the Seventh Malaysia Plan ending with the Ninth Malaysia Plan. The recruitment of international students is held as one of the drivers of the national economy (as presented in the New Economic Model 2010 and Tenth National Model 2010 in Malaysia). The strategies used for the high ranking of Malaysian universities were primarily increasing international students and staff population and increasing numbers of research outputs in high-impact journals. After the launch of the National Educational Strategic Plan in 2007, there were four strategies confirmed by the plan: (i) enhancing global networks at all levels, (ii) expanding international programs for international students, (iii) increasing international students, and (iv) promotion through branding [3]. In a way, Kazakhstan wishes to follow in the steps of Malaysia in becoming a world educational hub; however, with the difference that the rationale behind Malaysian internationalization is economic rather than social.

In contrast to internationalization in Kazakhstan and Malaysia, the internationalization of higher education in the U.S. is decentralized in character. Although there is a conceptual framework of Comprehensive Internationalization developed by the American Council on Education (ACE), the United States institutions are flexible to internationalize diversely according to their missions and goals [4,5]. The Center for Internationalization and Global Engagement (CIGE) conducts mapping surveys and assesses the current state of internationalization at American colleges and universities, analyzing progress and identifying future priorities. This survey addresses six critical areas specified in the Model of Comprehensive Internationalization: articulated commitment; administrative structures and staffing; curriculum, co-curriculum, and learning outcomes; faculty policies and practices; student mobility; and collaboration and partnerships. Findings of the 2016 mapping survey showed that United States institutions are optimistic about their internationalization progress: student mobility is still a focus of internationalization, as well as an increase in the implementation of academic and co-curricular programs, international professional development, and international partnerships [6].

The results of the 2021 report of the North American International Partnership and Agreement Practices survey conducted by QS Unisolution have identified a more strategic approach to internationalization in higher education in the United States and Canada. A comparison over time shows 78% of respondents had an internationalization strategy in place. Student mobility takes the top priority for 17% of the respondents. Deepening the existing partnerships and raising the reputation represent the top priorities [7].

International education has been a part of public diplomacy in the United States Fulbright programs, and the Peace Corps initiative is an example of a successful implementation of that. In addition, this year, the United States Departments of State and Education released a new Joint Statement of Principles in Support of International Education at the

2021 Education USA Forum, giving a new impetus to the increase in internationalization efforts for higher education institutions in the United States [8].

It is evident and essential to note that the primary concern in the internationalization of U.S. institutions is the issue of ethics. Adverse consequences of internationalization and globalization and brain-drain challenges are discussed in the codes and standards of associations dealing with international education [9–13]. The conferences and forums organized by the Association of International Education Administrators (AIEA), National Association for Foreign Student Affairs (NAFSA), Institute of International Education (IIE), and American Council on Education (ACE) all contribute to the shaping of internationalization in higher education institutions in the United States.

The main directions for capacity building for internationalization in the project reported here are drawn from experience from around the world, including practices from existing foreign and local organizations involved in higher education in Kazakhstan. For example, the British Council internationalization study at Kazakhstan's regional universities suggests a set of academic needs of higher education for internationalization [14]. However, practices at Kazakhstan's higher education institutions show a general lack of capacity building for internationalization (for example, in internationalizing domestic research). Moreover, with full recognition of the necessities and advantages of internationalization activities, restrictions to internationalization are evident also—for example, the emigration of young people and lack of funding in Kazakhstan are challenges for the internationalization of higher education. Moreover, the exchange programs are mainly implemented through undergraduate studies, while international students predominantly study in local undergraduate programs.

Furthermore, local higher education institutions mostly partner with universities from nearby countries like Russia and Eastern Europe. Additionally, knowledge of foreign languages and intercultural communication have been common barriers to international cooperation and, thus, to higher education in Kazakhstan. A low level of English in taught programs and a decrease in international students' recruitment to Kazakhstan universities have been observed more prominently recently. Nevertheless, when effectively articulated and implemented, a capacity-building framework for the internationalization of a Kazakh university should create the potential for international partnerships, allowing participants to critically understand local and global relationships, expand internationalization reference frames, and provide opportunities for rethinking partnerships.

The application of digital learning technologies, as a component of the capacity-building framework and corresponding teaching and learning practices, is understood in our project to hold the critical capacity to contribute to internationalization by creating opportunities for collaborative knowledge co-creation, innovative designs, and increased responses to changes. Furthermore, the English language education of a university's staff and students is also critical for internationalizing teaching and learning. This would create the potential for international educational programs. The design of the international scientific and academic environments, supporting English as a foreign language learning for teachers and future professionals (e.g., through e-learning interventions, such as MOOCs), would lead to expanded intercultural contacts with opportunities for individual and collective activities and creative collaboration. Such approaches would contribute to a deeper understanding of local–global connections and an improvement in the quality of higher education in general.

2. About the Project

The Karaganda Technical University ('KTU') acted as the object of analysis for this project. The KTU is one of the leading technical universities in Kazakhstan, with more than 11,000 students and 600 academic staff members. Established in 1950, the KSU is at present ranked in the Top 801-1000 QS Global World Rankings 2021. The KTU is an innovative and entrepreneurial university, providing comprehensive training of competitive specialists with undergraduate, higher, and postgraduate education that meets the requirements of

the modern socio-economic environment, based on the integration of education, science, innovation, industry, and business.

The project explored approaches to the internationalization processes, examining benchmarking methodologies for internationalization, comparing the effectiveness of the internationalization processes, developing an action plan for benchmarking (including the five stages of planning, analysis, projecting, correlation, and measurement management and realization of solution), and articulated an approach to monitoring capacity building for the internationalization of teaching and learning.

The project's primary purpose has been to develop and implement a sustainable strategy for internationalizing a technical university, taking into account the national and international contexts, evaluating internationalization capacity needs, formulating and implementing capacity-building responses for internationalization and enhancing the qualifications and abilities of students and teachers at the international level. Through these, the project aim was to contribute to the socio-educational and scientific-technological developments in Kazakh society. Furthermore, the project examined the internationalization of higher education through the prism of digital learning technologies, which are considerably limited, but of great interest in Kazakhstan higher education. The project notes that leading foreign universities have actively used technologies and innovative teaching strategies and learning designs. International experience surpasses domestic practice by far in the usage of digital learning technologies. This is not due to the lack of local technical expertise but mainly to the philosophy underlying teaching and learning. Developing innovative teaching and learning strategies and methodologies for implementing digital learning technologies in domestic practice would enhance the internationalization effort of Kazakhstan universities. Thus, an essential objective of the project has been to develop and implement a framework for internationalization capacity building at a technical university in Kazakhstan through the application of digital learning technologies as one of the essential components.

To develop this framework for capacity building for the internationalization at a technical university, the SWOT analysis was developed and applied with a focus on seven categories:

(i)   institutional commitment;
(ii)   administrative leadership, structure, and staffing;
(iii)   curriculum, co-curriculum, and learning outcomes;
(iv)   faculty policies and practices;
(v)   student mobility;
(vi)   collaboration and partnership; and
(vii)   research and development.

The following tasks were completed to study the internationalization process at KTU university:

(i)   Analysis of benchmarking of higher education internationalization;
(ii)   Study of domestic and foreign internationalization of universities' education processes; and
(iii)   Analysis of project experiences and preparation of recommendations for implementation of changes.

3. Benchmarking of Internationalization Process at a Technical University

To articulate a framework for the internationalization of higher education, we conducted a comparative analysis of the benchmarking of universities' internationalization activities. According to the literature, the most appropriate benchmarking approaches in higher education are (a) internal benchmarking, (b) external benchmarking, (c) competitive benchmarking, and (d) functional benchmarking [15–18]. In the context of our project, we have considered the benchmarking analysis according to an approach by Lifanov [19], which includes:

(i)　Reciprocity—when activities are based on mutual relations, agreement, and data exchange;

(ii)　Analogy—when the operational processes of partners should be similar;

(iii)　Measurement—when comparing the characteristics measured at several enterprises; and

(iv)　Reliability—when actual data are applied, including an accurate analysis of the implementation and study of the process.

We considered the benchmarking approach developed by scientists of the Academy of Economic Research in Romania [20]. Finally, our review resulted in the articulation of a benchmarking approach that includes five stages:

(i)　Planning;

(ii)　Analysis;

(iii)　Projecting and correlation;

(iv)　Measurement management; and

(v)　Implementation of solutions and progress monitoring aimed at sustainable capacity building of the internationalization of higher education.

The comparative analysis allowed us to determine the number of benchmarking criteria covering most internationalization areas. Benchmarking, as an effective tool for improving activities of the university, would require [21–24]:

(i)　An increased degree of interest and participation in identifying benchmarking criteria;

(ii)　Consideration of the trends in educational policy development;

(iii)　Choosing a system or methodology that collects primary data and determines the level of their reliability; and

(iv)　Analysis and interpretation of the data obtained based on the proposed indicators.

Comparisons of activities (for example, recruitment of international students, attracting foreign scientists, and entering into and executing international treaties and agreements), identification of what is being done to achieve internationalization, and the development of complete understanding of the process are conducted through process mapping [6]. We believe that process mapping deserves additional attention from researchers in higher education internationalization since this can expose successes or failures when comparing practices at our university compared with partner universities. The characteristics of the process under consideration, the determination of its success or failure, are guided by a set of parameters, indicators, and measurements—or "benchmarks"—based on which we can collect information and data, characterize, and "measure" the selected process and compare it with the "standard". This tool, or a set of tools, is called performance measurement [16]. When benchmarking, it is recommended that a set of practical tools are applied to diagnose, improve, collaborate, constantly compare, and measure progress. To analyze internationalization at a technical university, also we used benchmarking tools, such as questionnaire design and administration, interviewing, and an analysis of etiquette and legal issues [18,25,26].

To cover the critical aspects of university internationalization, using one single tool is not sufficient. The experience of benchmarking in university internationalization has shown that the process is challenging to evaluate and compare. Gao [23] specifies 17 internationally recognized indicators of internationalization. We applied these in a questionnaire designed for internationalization performance at TASK universities in the Republic of Kazakhstan. The questionnaire, based on qualimetry and the Likert scale, was necessary for quantitative data associated with qualitative indicators. Benchmarking analysis, also considered benchmarking, was developed in the business sector and its successful methods were adapted to education. The final benchmarking approach includes the analysis stage of benchmarking.

4. SWOT Analysis of Capacity for Internationalization at the KTU

The assessment of capacity building for internationalization at a technical university in Kazakhstan in the project was assisted by utilizing multifunctional SWOT analysis

leading to the identification of internal and external factors for capacity building for internationalization. The multi-factor SWOT analysis made it possible to identify the ratio of strengths/weaknesses and threats/opportunities, and their influence on each other, and to determine the most significant strategic decisions for internationalization capacity building at a technical university.

The SWOT analysis was developed based on the university's "Policy and Goals in the Field of Quality" [27], "Strategic Plans of the KTU for 2018–2022 and 2014–2023", "Comprehensive Development Program of KSTU for 2020", "Academic Policy" [28], "Anti-Corruption Standard of the University" [29], "Rules of Ethics of the University" [30], and interviews with Deans of Faculties, Heads of Departments, and other stakeholders. In addition, the "Strategic Plan for 2014–2023" was also applicable, as it identified eleven systematic problems that hinder the effective development of the university. These problems were typical for higher technical education in Kazakhstan. Therefore, these problems have been incorporated into the SWOT analysis. Furthermore, the analysis of domestic and foreign theory and practices of internationalization [31,32] and the report of the Vice-Rector for Internationalization of KSTU (2019), Dr Margaret-Mary L Nelson, invited under the program "Top Managers" of the Ministry of Education and Science of the Republic of Kazakhstan, were used as sources for determining the scheme of the SWOT analysis (see Figure 1).
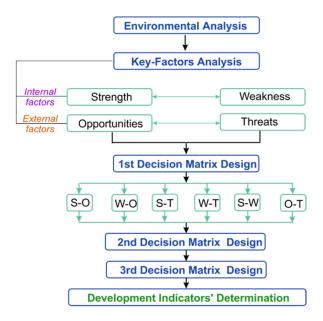

Figure 1. Multi-factor SWOT analysis scheme.

The factors in each placeholder of the SWOT analysis framework were separated into seven main categories of internationalization. These categories are based on Gao's (2018) dimensions and modified by the project team to include the following set:

(i) **Institutional Commitment**—Internationalization at the university level, the role of internationalization in the strategic development plan and the mission of the university, financing of internationalization, and the assessment of the current progress and impact of internationalization on the university and its further directions;

(ii) **Administrative Leadership, Structure, Staffing**—Administrative management, management structure, work with administrative personnel, roles of senior managers, the division of labor across administrative offices, and the professional development of administrative staff;

(iii) **Curriculum, Co-curriculum, Learning outcomes**—Internationalization of curricula and extracurricular activities, and evaluating student academic requirements and learning outcomes;

(iv) **Faculty Policies and Practices**—Faculty member recruitment, awards, and professional development;

(v) **Student Mobility**—Student mobility (incoming and outgoing mobility), recruitment of international students, support for international students (e.g., language courses, programs of acquaintance with the culture of the country), preparation of Kazakhstani students for studying abroad, administration and financing of exchange programs for Kazakhstani students;

(vi) **Collaboration and Partnership**—Inter-university partnership, double-degree programs, image and representation of universities internationally; and

(vii) In addition, we singled out as a separate category that focuses on **Partnership in Research and Development** with foreign universities.

At the next stage of the project, a SWOT analysis matrix was compiled, including four standard squares, in which the key parameters that affect the achievement of the goals were placed. A fragment of the SWOT matrix covering the internal commitment to internationalization factors is shown in Table 1 (the complete set of matrixes/appendixes is available for preview by readers in Appendices of Supplementary Materials).

Table 1. A fragment of the SWOT matrix covering Internal Commitment to Internationalization (see Appendix A in Supplementary Materials).

	Strength (S)	Weakness (W)
Internal Commitment factors	*1. Institutional Commitment* 1.1. Rating positions - Significant increase in QS rating for 2 years after joining - KTU has entered the RankPro Rating - KTU has entered the Webometrics Rating - 1st place among technical universities in Independent Agency for Quality Assurance in Education (National Ranking) - 1st place among technical universities in Independent Agency for Accreditation and Rating (National Rating) *2. Administrative Leadership, Structure, Staffing* 2.1. A government policy has been implemented in the administrative structure of KTU. 2.2. Transfer from permissive to consultative management style at KTU. 2.3. An incentive scheme and the HiPos' system have been developed.	*1. Institutional Commitment* 1.1. Low interest of the faculty and scholars in participating in the international projects. 1.2. Low level of membership in international associations. 1.3. Insufficient digitalization of the educational process. 1.4. The library collection is mainly in Kazakh and Russian languages. 1.5. Insufficient funding for international projects at the expense of government funding or extrabudgetary funds of KTU. 1.6. Low level of participation in international educational fairs and forums. *2. Administrative Leadership, Structure, Staffing* 2.1. Lack of transparency in administrative management processes. 2.2. Lack of interconnection between intra-university processes. 2.3. Low level of time management. 2.4. Qualification requirements of administrative staff have been partially accorded with international standards. 2.5. Insufficient elaboration of internationalization issues in the internal strategic documents of the university. 2.6. Low level of administrative staff's digital competencies. 2.7. Insufficient involvement of the faculty and students in corporate governance processes.

To analyze the data collected, a compilation of further matrixes was conducted. The data was collected from the report of the Vice-Rector for Internationalisation of KSTU (2019), Dr Margaret-Mary L Nelson, and further analysis by the project team. Thus, a set of next-level matrixes segmented the SWOT matrix into groups of decision matrixes 1–3. The decision matrix 1 or the solution matrix 1 incorporated potential solutions in the following directions:

(i)   S-O line of strength—identifying strengths and opportunities for development;
(ii)   W-O line of improvement—including the intended levelling of shortcomings;
(iii)   S-T line of defense—defining the line of advantages to protecting against uncontrolled external factors; and
(iv)   W-T line of warning—identifying measures necessary to prevent future risks.

Furthermore, we examined the influences of external factors on each other to identify possible changes in the external environment in the line of O-T forecasting. Additionally, the analysis of the S-W line revealed the factors that made it possible to exclude influences of weaknesses on the development of internationalization processes at the university and the possibility of neutralizing challenges. A fragment of decision matrix 1 along the S-O line is shown in Table 2.

Table 2. Fragment of decision matrix 1 along the S-O line (see Appendix B in Supplementary Materials).

Scheme		
Strength	**Opportunities**	**Strategy**
1. Institutional Commitment		
1.1. Rating positions - Significant increase in QS rating for 2 years after joining - KTU has entered the RankPro Rating - KTU has entered the Webometrics Rating - 1st place among technical universities in Independent Agency for Quality Assurance in Education (National Ranking) - 1st place among technical universities in Independent Agency for Accreditation and Rating (National Rating)	1.1. Leading position in training specialists in technical areas among the universities in Central Asia. 1.2. Improving the QS rating positions. 1.3. The development of alumni association for supportive collaboration.	1. To improve the quality of technical education per international standards. 2. To create a special interaction service for communication with graduates, including those living abroad. 3. To create an open interactive digital platform for finding potential sponsors or partners to participate in critical educational events and projects.
2. Administrative Leadership, Structure, Staffing		
2.1. A government policy has been implemented in the administrative structure of KTU. 2.2. Transfer from permissive to consultative management style of KTU. 2.3. An incentive scheme and the HiPos' system have been developed.	2.1. Annual training courses for administrative staff in management and communication skills at national and international levels.	1. To develop university's standards for internationalization of administrative processes. 2. To organize training, panel discussions, and advanced training workshops for administrative staff involved in the process of management.

Some of the emerging solutions for each of the lines entirely or partially duplicated each other. Therefore, it was necessary to exclude 'double-decisions.' To this end, the next step of the project introduced the coding of the factors for which possible decisions have been developed. Possible strategies are distributed in decision matrix 2 in such a way as to show a relationship with the factors of the external and internal environment. The factors were encoded as follows:

(i)   Strengths—SN; N-sequence number of factor;
(ii)   Weaknesses—WN; N-sequence number of factor;
(iii)   Opportunities—ON; N-sequence number of factor; and
(iv)   Threats—TN, N-sequence number of factor.

A fragment of decision matrix 2 is shown in Table 3.

Table 3. Fragment of decision matrix 2.

Institutional Commitment		
	Strength	**Weakness**
Internal factors **External factors**	1.1. Rating positions - Significant increase in QS rating for 2 years after joining - KTU has entered the RankPro Rating - KTU has entered the Webometrics Rating - 1st place among technical universities in Independent Agency for Quality Assurance in Education (National Ranking) - 1st place among technical universities in Independent Agency for Accreditation and Rating (National Rating)	1.1. Low interest of the faculty and scholars in participating in the international projects. 1.2. Low level of membership in international associations. 1.3. Insufficient digitalization of an educational process. 1.4. The library collection is mainly in Kazakh and Russian languages. 1.5. Insufficient funding for international projects at the expense of government funding or extrabudgetary funds of KTU. 1.6. Low level of participation in international educational fairs and forums.
Opportunities	**Possible strategies:**	**Possible strategies:**
1.1. Leading position in the field of technical specialists training among the Central Asia universities. 1.2. Improving the QS rating positions. 1.3. The alumni association's development for supportive collaboration.	1. To improve the quality of technical education per international standards. (S1, O2) 2. To create a special interaction service for communication with graduates, including those living abroad. (O3) 3. To create an open interactive digital platform for finding potential sponsors or partners to participate in critical foreign educational events and projects. (S1, O2) 4. To take part in exchange programs Erasmus+, DAAD, and Fulbright. (O1, T5, T6) 5. To create a system of incentives for the faculty and scientists to expand international cooperation and form a network of international collaborators. (O1, T1, T4) 6. To develop the road map with a partner university before signing a new agreement. (O1) 7. To create the university marketing service. (O1, T5, T6) 8. To develop the intra-university standards of administrative processes, including internationalization policy. (O1, T5, T7) 9. To develop the map of critical competencies and career skills for students/future engineers, being ready for participation in education abroad via the exchange programs and having a high level of language proficiency and academic skills. (O1, O2, T2, T3, T6)	1. To encourage the participation of the faculty and scholars in international projects. (W1, O1) 2. To increase the percentage of membership in international associations. (W1, O1, O2) 3. To create an open interactive digital platform for finding potential sponsors and partners in key educational events and projects abroad. (W3, W5) 4. To provide the university with English-language electronic library resources due to cooperation with partners abroad. (O1, O2, W3) 5. To develop cooperation with foreign publishing houses and organizations providing electronic resources. (W4, W6) 6. To search for new awards programs for collaborative funding initiatives. (W1, W5, W2, O1) 7. To increase the level of participation in international fairs. (W6, O1) 8. To create the university marketing service. (O1, O2) 9. To increase the level of foreign partners' involvement in exchange programs. (W1, W6, T3) 10. To sign partnership agreements with foreign universities. (W1, T6, W4) 11. To open the university official representative office abroad. (T6, W2) 12. To provide recruitment and support of international students. (W4, W6, T8)

Table 3. *Cont.*

Institutional Commitment		
Threats	**Possible strategies:**	**Possible strategies:**
1. Insufficient number of applications converting for funding research projects and a lack of international partners due to Kazakhstan's restrained position at the international level. 2. Increasing rating of QS partners. 3. Declining position in the world rankings. 4. Regulated model of budget financing. 5. The lack of a systematic approach to internationalization in the current strategic documents in KTU. 6. Youth emigration to universities abroad. 7. E-learning in higher education in Kazakhstan due to the coronavirus pandemic. 8. Lack of funding/limited funding for student grants, researchers, and staff development.	1. To provide the permanent presence and presentation of the university at the international level by sending faculty and scholars to international conferences, seminars, and forums to increase the rating and recognition of the university. (S1, T2, T3) 2. To search for new mechanisms for financing international initiatives and budget funds dependence on national funding. (T4, T1) 3. To create mechanisms and tools for attracting gifted students. (S1, T6) 4. To take part in training abroad for improvement of the skills of the faculty on the use of distance learning technologies. (S1, T7, T8) 5. To create a new university digital resource to neutralize threats in training and employing distance learning technologies. (T7, T6) 6. To search for international funds to finance educational, scientific, and sports student initiatives. (T1, T6, T4) 7. To search for new programs and contests for collaborative initiatives funding. 8. To search for new funding sources for students' exchange programs and advanced training courses for faculty. (T4, T8) 9. To develop the university's management corporate standards. (T1, T3, T5, T8)	1. To improve the quality of technical education per international standards. (T2, T3) 2. To provide the university with English-language electronic library resources due to cooperation with partners abroad. (W4, T6) 3. To identify new components of the curriculum for implementation with international academic requirements for students. (T3, T6, W2) 4. To provide the permanent presence and presentation of the university at the international level by sending faculty and scholars to international conferences, seminars, and forums to increase the rating and recognition of the university. (T1, T2, Y3, W2, W6) 5. To search for new programs and award competitions for collaborative initiatives funding. (T1, T4, W1, W5) 6. To develop the intra-university standards of administrative processes, including internationalization policy. (T5, W2) 7. To develop a digital system for ensuring the implementation of internationalization strategies through the creation of a specialized digital interaction system, including the modelling of the e-learning space to form the professional foreign language competence of future engineers. (T2, T3, T7, W3, W4)

A further developed matrix, decision matrix 3, explicated a list of necessary strategic decisions for each group of factors of internationalization. Coding these factors allowed the tracking of their comprehensive coverage of the proposed decisions. A fragment of the decision matrix 3 is shown in Table 4.

Table 4. Fragment of the decision matrix 3 (see Appendix I in Supplementary Materials).

№	Strategies	Factors
	Institutional Commitment	
1	To increase the level of foreign partners' involvement in exchange programs	W1, W6, T3
2	To sign partnership agreements with foreign universities	W1, T6, W4
3	To provide the university with English-language electronic library resources due to cooperation with partners abroad	O1, O2, W3, W4, T6
4	To provide the permanent presence and presentation of the university at the international level by sending faculty and scholars to international conferences, seminars, and forums to increase the rating and recognition of the university	T1, T2, T3, W2, W6
5	To develop a map of critical competencies and career skills for students/future engineers, being ready for participation in education abroad via the exchange programs and having a high level of language proficiency and academic skills	O1, O2, T2, T3, T6
6	To identify new components of the curriculum for implementation, taking into account international academic requirements for students	T3, T6, W2
7	To open the university official representative office abroad	T6, W2
8	To improve the quality of technical education per international standards	S1, O2, T2, T3
9	To search for new programs and awards for funding collaborative initiatives	W2, O1, T1, T4, W1, W5
10	To provide recruitment and support of international students	W4, W6, T8
11	To develop cooperation with foreign publishers and organizations, providing electronic resources	W4, W6
12	To develop the intra-university standards of administrative processes, including internationalization policy	O1, T5, T7, W2
13	To develop a digital system for ensuring the implementation of internationalization strategies through the creation of a specialized digital interaction system, including the modelling of e-learning to form the professional language competence of future engineers	T2, T3, T7, W3, W4
14	To create the university marketing service	O1, O2, T5, T6
15	To create an open interactive digital platform for finding potential sponsors or partners to participate in key foreign educational events and projects	S1, O2, W3, W5
16	To develop a road map with a partner university before signing a new agreement	O1
17	To create a system of incentives for faculty and scholars to expand international cooperation and to form a network of international collaborators	O1, T1, T4
18	To create a special interaction service for communication with graduates, including those living abroad	O2
19	To encourage the participation of the faculty and scholars in international projects	W1, O1
20	To increase the percentage of membership in international associations	W1, O1, O2
21	To increase the level of participation in international fairs	W6, O1
22	To take part in the exchange programs Erasmus+, DAAD, and Fulbright	O1, T5, T6

At the next stage of the project, the overlap of strategies and redundancies was eliminated, and indicators were consolidated. Thus, the matrix of indicators contains the finally developed indicators, which are the basis for correlating with the benchmarking factors. Based on the SWOT analysis results, the resulting matrix incorporated **57 indicators** that determine indicators/measures for the capacity building of internationalization of the educational process at a technical university. The list of the indicators is shown in Table 5.

Table 5. Matrix of indicators (see Appendix J in Supplementary Materials).

№	Indicators
1	Active involvement of existing foreign partners in academic mobility programs
2	Implementation of research results or applied research in the real sector of the economy
3	Resumption of work under previously concluded contracts
4	Allocation of budgetary funds for language support of teachers for conducting classes in three languages
5	Identification of priority areas for advanced training of the teaching staff, including the development of language and digital competencies, and intercultural communications
6	Conclusion of partnership agreements with universities from far abroad
7	Ensuring the continuity of curricula
8	Providing the university with English-language electronic library resources through cooperation with foreign partners
9	Ensuring the constant presence and presentation of the university in the international arena by sending teaching staff and scientists to international conferences, seminars, and forums to increase the rating and recognition of the university
10	Providing language support in preparation for entrance exams for master's and doctoral studies
11	Determination of critical competencies and skills in readiness for the careers of students/future engineers in international companies, preparation of future technical specialists for training in other countries and with the presence of the necessary foreign language and educational outlook
12	Definition of new components of implementation in curricula, taking into account international academic requirements for students
13	Organization of courses on the development of "soft skills" and business administration skills for teaching staff and scientists
14	Organization of postgraduate accompaniment of graduates
15	Opening of the official representative office of the university abroad
16	Translation of the accumulated materials into English to publish them in international journals
17	Improving the quality of technical education per international standards
18	Improving the quality of preparation of articles in English for the publication of research results for submission to the international scientific community
19	Search for funding mechanisms for educational, scientific, and sports student initiatives, in addition to budget funds to reduce dependence on republican funding
20	Search for new foreign partners to motivate scientific personnel
21	Search for new sources of funding for the organization of mobility and internships for teaching staff
22	Search for new areas of cooperation within the educational activities of the university, as well as the provision of specialized services based on existing institutions of the university
23	Search for new programs for the organization of academic mobility of students, funded by extrabudgetary funds and funds of the university
24	Search for new programs and competitions for financing collaboration initiatives
25	Attracting and supporting international students
26	Involvement of foreign scientists for consultations on the development of curricula in the framework of partnership agreements
27	Involvement of regional and foreign employers in the definition of key competencies of graduates to create a base of key competencies of graduates that meet international standards
28	Application of international practice of creating a support group for postgraduate support and undergraduate study programs
29	Application of research results in the development of educational programs
30	Conducting training, round tables, and refresher courses, including with the participation of foreign specialists, for administrative workers involved in managing the process of the internationalization of the university

Table 5. *Cont.*

№	Indicators
31	Development of cooperation with foreign publications and electronic resources.
32	Development of intra-university standards for administrative processes in the field of internationalization
33	Development of an information system that ensures the implementation of internationalization strategies through the creation of a specialized system of digital interaction, including modelling an e-learning space to form professional foreign language competence of future engineers
34	Development of corporate management standards
35	Development of a methodology for the language training of university staff and students as a condition for the development of key methodological competencies for teaching and learning in English
36	Development of mechanisms for the interaction of all subjects of the educational process of internationalization through an integrated information learning system
37	Development of an open dialogue platform to attract foreign partners to conduct scientific research and commercialize the results obtained
38	Compliance and development of algorithms for administrative management processes, transparency, and interconnection
39	Improving the library system to increase the availability of resources for students
40	Creation of infrastructure to support the introduction of new technologies in teaching, research, and management
41	Marketing service creation
42	Creation of a new proprietary information resource to neutralize threats during training using DLE
43	Creation of an open dialogue digital platform for finding potential sponsors/partners to participate in key foreign educational events and projects
44	Creation of an action plan with a partner university before concluding a new contract
45	Creation of a network library with foreign partners
46	Creation of an incentive system for teaching staff and scientists to expand international cooperation and form a network of international collaborators
47	Creation of a specialized service for communication and interaction with graduates, including those living abroad
48	Encouraging young scientists to conduct research and obtain doctoral qualifications
49	Encouraging teaching staff and scientists to participate in international projects
50	Stimulating the entrepreneurial activity of teaching staff and students, including for participation in projects to find sponsors for the implementation of start-ups
51	Increasing the share of membership in international associations
52	Increasing the amount of electronic content on the university website in English
53	Increased participation in international exhibitions.
54	Increasing the participation of teaching staff and scientists at international seminars, conferences, and forums
55	Establishing and strengthening ties with regional and republican industries
56	Participation in foreign courses to improve the qualifications of teaching staff on the use of DLE
57	Participation in exchange programs like Erasmus+, DAAD, and Fulbright

5. Evaluation of the Development of Internationalization through a Survey

Evaluation of the development of the internationalization of Kazakhstan's universities was carried out through a survey designed for that purpose. According to the Knyazev qualimetric scale [8], the project team was required to qualitatively determine the direction of internationalization using the established criteria. The characteristics of the internationalization process under consideration and the determination of its successes or failures were set by performance measures identified in the literature [6,15]. A set of measures or indicators was developed for universities to use in their contexts and countries to measure

their internationalization and, therefore, apply these in benchmarking processes. This can provide universities with insight into their activities internationally and offer options for benchmarking practices with comparison universities. This system of indicators aims to cover internationalization in the broadest sense and is both a universal measurement tool and a convenient, practical tool.

The survey consisted of close-ended questions based on 15 indicators from Gao (2018) overlapping the six main categories of university internationalization:

(i)   International joint research programs;
(ii)   International research centers;
(iii)   International researchers;
(iv)   Internationally recognized research achievements;
(v)   International students;
(vi)   Student mobility;
(vii)   International profile of the faculty;
(viii) International view and experience of the faculty;
(ix)   Courses with an international component;
(x)   Joint programs;
(xi)   Students' participation in international research;
(xii)   Human resources for international activities;
(xiii) Financial support for internationalization;
(xiv)   International alumni presence;
(xv)   International networks and partnerships.

For each question, a five-point Likert scale was presented so that respondents could input their selection:

(i)   1—the direction of development is not taken into account;
(ii)   2—is implemented at the formal level;
(iii)   3—is not implemented systematically;
(iv)   4—a sufficient level for positioning the university at the international level;
(v)   5—a high level of implementation.

The survey was conducted online via Google Forms with complete confidentiality to obtain a more accurate picture of internationalization by the respondent universities. The respondents were reached at a Telegram channel organized by the Ministry of Education and Sciences. This channel includes 164 participants formed by international administrators such as Heads of International Centers and Directors of International Relations Departments across several Kazakh universities including Satpayev University, Aktobe regional university, Ualikhanov Kokshetau University, Baytursynov Kostanay University, Toraighyrov University, Karaganda Industrial University, Auezov South-Kazakhstan University, Serikbayev East Kazakhstan Technical University, and Seifullin Agrarian University. These administrators were from diverse universities, national and regional. The link to the survey was sent to this channel to solicit responses. Thus, a total of 54 respondents, administrators of international departments of Kazakhstani universities, completed the survey.

The questions presented in the survey were divided into groups according to the six main categories of internationalization discussed previously in this paper. The analysis of the survey results is shown in Table 6.

Table 6. Survey results on the questionnaire about the level of internationalization of Kazakh universities.

Categories	Share Distribution of Level of Internationalization Development*				
	1*	2	3	4	5
R&D					
International cooperative research programs	20%	-	40%	40%	-
International-focused research centers	20%	20%	20%	40%	-
International researchers	10%	-	40%	40%	10%
Internationally acknowledged research achievements	10%	10%	40%	40%	-
Student					
International students	10%	10%	40%	40%	-
Mobility of students	10%	-	20%	60%	10%
Faculty					
The international profile of the faculty team	10%	30%	30%	10%	20%
International perspective and experience of faculty	20%	10%	40%	20%	10%
Curriculum					
Courses with international components	20%	10%	40%	20%	10%
Joint degree programs	20%	20%	40%	20%	-
Students' participation in international studies	10%	-	40%	40%	10%
Administration					
Human resources for international activities	10%	30%	30%	30%	-
Financial support for internationalization	10%	30%	40%	20%	-
Infrastructure and facilities for internationalization	10%	20%	40%	30%	-
International presence	20%	50%	10%	20%	-
Engagement					
The international presence of alumni	20%	10%	50%	20%	-
International networks and partnerships	10%	20%	40%	30%	-

The following level of achievement by indicators are revealed.

5.1. The "Research and Development" Group

Regarding the "*International joint research programs*" indicator, 40% of respondents note that it has reached a rate sufficient for positioning their universities at the international level. At the same time, the same number of respondents indicated a lack of systemic development in this area. In universities, 20% of respondents did not take this indicator into account.

Regarding the "*Internationally focused research centers*" indicator, 40% reported sufficient development in this direction, 20% of respondents noted the lack of development in the direction of this indicator.

Concerning the "*International researchers*" indicator, opinions are unevenly divided: 40% of respondents are divided between unsystematic and a sufficient level of implementation; 10% of respondents believed that the level of implementation of the indicator was high. At the same time, a large number of respondents claim that the direction is ignored.

A similar picture was formed regarding the "*Internationally recognized research achievements*" indicator, except for 10% of respondents who noted only a formal implementation approach.

The results indicate the absence of a single mechanism for supporting and developing international research at universities in the Republic of Kazakhstan. At the same time, the degree of success of development in this direction depends more on random factors than on a strategic policy.

5.2. The "Student Mobility" Group

Concerning the level of development of the "*International students*" indicator, 40% of respondents indicated that the level of implementation was sufficient. However, the same number claimed that the indicator lacked development. In contrast, the rest of the respondents expressed opposite opinions: 10% indicated a high level of development in this direction, and 10% noted that this direction is overlooked.

According to 10% of respondents, the "*Mobility of students*" indicator was high, and for 60% sufficient for positioning the university at the international level. Although about 20% responded that the organization of the process is unsystematic, 10% of respondents indicated that the direction was not developing.

Thus, it can be noted that the current development was positive, but the results also revealed an unsystematic implementation that has significantly slowed down the advancement.

5.3. The "Faculty Policies and Practices" Group

The "*International profile of faculty team*" indicator was characterized by a wide discrepancy in responses: 20% of respondents report a high level of implementation, along with 10% of respondents reporting both a sufficient level of development or its complete absence, while 30% of respondents reported a non-systemic and formal approach to implementation.

Concerning the "*International perspective and experience of faculty*" indicator, the most significant number of respondents—40%—reported a non-systemic approach, while the rest of the respondents reported high and sufficient levels, as well as formality and lack of development—10%, 20%, 10%, and 20%, respectively.

The revealed imbalance clearly shows the problem with development in this direction. Similarly to other indicators, there was no single regulatory mechanism or a strategy for formal implementation.

5.4. The "Curriculum" Group

According to the "*Courses with an international component*" indicator, only 10% of the respondents had a high level of work opportunities, and 20% had a sufficient level. For 20%, this indicator did not develop at all. The most significant number of respondents (40%) responded that there was no systematic approach; 10% reported a formal approach in this direction.

For the "*Joint degree programs*" indicator, the maximum number of respondents (40%) indicated a lack of systematicity; 20% of the respondents were divided between a sufficient level, lack of development, and a formal approach.

Within the "*Students' participation in international studies* " indicator, the responses were distributed as follows: 40% of respondents responded that the level of development was sufficient and non-systemic. A total of 10% of the vote was divided between a high level of development and its complete absence.

For the respondents, the lack of systematicity and formality of the approach were identified as its main limitation. At the same time, a relatively large number of respondents considered the current level sufficient for positioning in the global educational space.

5.5. The "Institutional Commitment" Group

For the "*Human resources for international activities* indicator, the responses were distributed almost evenly: 30% of respondents note formality, non-systemic, and sufficient development levels. However, 10% believe this indicator was not developed.

A high level of formality (30%) and non-systematic nature (40%) were identified in responses to the "*Financial support for internationalization*" indicator. At the same time, 20% of respondents considered the level of development sufficient, and 10% noted the lack of development.

The absence of the system was revealed by responses to the "*Infrastructure and facilities for internationalization*" indicator (40%) and "*International presence*" indicator (50%). At the same time, the current level was held as sufficient for these indicators by 30% and 20%, respectively. According to the "*Infrastructure and facilities for internationalization*" indicator, 20% of respondents noted formal implementation, and 10% lacked development. For the "*International presence*" indicator, the distribution of responses for these positions is the opposite.

For this group of indicators, the main characteristics reported were the absence of a system and the formality of processes, which negatively affected the implementation of indicators in other groups.

5.6. "Collaboration and Partnership" Group

Responses to the "*International presence of alumni*" and the "*International networks and partnerships*" indicators showed a lack of a system (50% and 40%, respectively). According to the "*International presence of alumni*" indicator, 10% of respondents consider the approach to developing the indicator as formal; 20% sufficient or absent. According to the indicator "*International networks and partnerships*," the responses showed that 30% considered the level of development of the indicator sufficient, and 10% not developed. In comparison, 20% of respondents noted a formal approach to the implementation of this indicator.

Thus, the analysis of the survey responses revealed negative features of the implemented processes, leading to the lack of a unified system and the formal approach at universities. However, responses achieved alone cannot explain the entire implementation effort at the universities. Therefore, there is a need to review the existing approaches for achieving a high level in each category of internationalization. This should lead to the development of strategic quality assurance and enhancement for internationalization.

6. SWOT and Benchmarking

In researching the development of strategies and tools for the internationalization of education at a technical university, our project engaged in analyzing the correlation of the benchmarking and SWOT analysis. For this purpose, a correlation matrix was compiled, where the indicators from the resulting SWOT analysis matrix were correlated with the benchmarked categories and factors of internationalization. This correlation was represented graphically through a hierarchical diagram that visualizes the interconnected areas (see Figure 2). Visualization of the data obtained allows the evaluation of changes and the development of appropriate strategic decisions tools. The corresponding factors for each strategic decision are shown as "SWOT N", where N is the sequence number of factors in the list for the capacity building of the internationalization of the educational process at a technical university, as shown in Table 3. The corresponding strategy (in the center of the figure) is linked to the factors grouped into the categories (on the right) and the 17 indicators of internationalization (on the left).
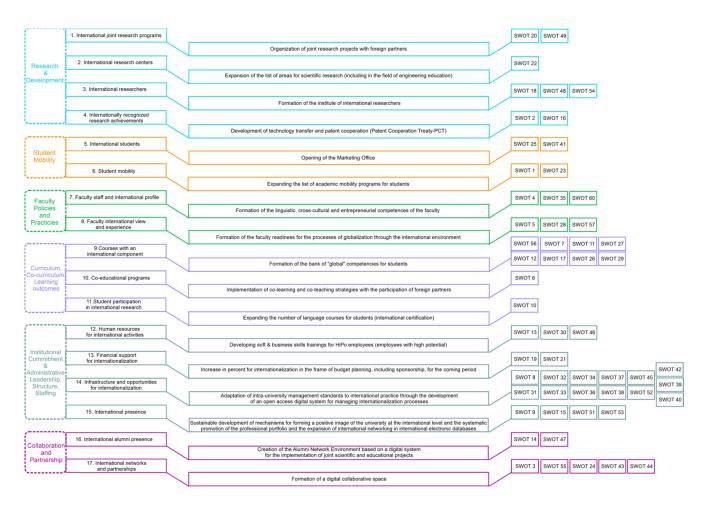
Figure 2. Correlation of SWOT analysis results with internationalization categories and indicators.

Based on the analysis of the correlation, the following critical strategies for improving internationalization at a technical university were derived and applied as the primary internationalization strategy of the KTU:

(i) Organization of joint research with foreign partners;
(ii) Expansion of the list of areas of scientific research (including in the field of education and technical profile of the university);
(iii) Formation of the Institute of International Researchers;
(iv) Development of technology transfer and patent cooperation (Patent Cooperation Treaty-PCT);
(v) Opening of the Marketing Office;
(vi) Expanding the list of academic mobility programs for students.
(vii) Formation of the linguistic, cross-cultural, and entrepreneurial competence of faculty.
(viii) Formation of faculty readiness for the processes of globalization through the international environment.
(ix) Formation of the bank of "global" competencies (global issues) of students.
(x) Implementation of co-learning and co-teaching strategies with the participation of foreign partners.
(xi) Expanding the number of language training students (international certification).
(xii) Organization of soft and business skills training for HiPo employees (employees with high potential).
(xiii) Increasing the share of internationalization expenditures in budget planning for the coming period, including sponsorship development.

(xiv) Adaptation of intra-university management standards to international practice by developing an open-access information system for managing internationalization processes.

(xv) Sustainable development of mechanisms for forming a positive image of the university in the international arena, systematic promotion of the professional portfolio, and expanding global networking in international electronic databases.

(xvi) Creation of the Alumni Network Environment based on an information system to implement joint scientific and educational projects.

(xvii) Formation of digital collaborative space.

Considering the broad categories and common problems, these strategies can be implemented and adopted by almost all universities in Kazakhstan.

7. Conclusions

To study the methodology for the benchmarking of the internationalization process at a technical university, three tasks were completed. Within the framework of Task i of the study, an analysis of the literature and benchmarking practices in higher education was carried out with the choice of a process-oriented type of benchmarking, which provides for benchmarking the process and result of the internationalization of the technical education system. The benchmarking methods were selected based on their degree of applicability in higher education. The algorithm for benchmarking the internationalization process using the functional analysis method, considering the expert opinion of top international managers, is defined. In solving Task ii, the foreign experience and practice of domestic universities in internationalization was studied. Their approaches to the characterization of the internationalization of higher education were examined. The general forms of the internationalization of higher education and the factors limiting the process of internationalization were determined. Standard vital processes were identified based on the analysis of the strategic documents of universities, and 6(+1) main categories of internationalization were determined according to international practice: institutional commitment, administrative management, internationalization of curricula, faculty, student mobility, cooperation and partnership, and research and development. Based on existing strategic documents, an analysis of the main processes of the university that affect the process of internationalization was carried out using a multi-factor SWOT analysis, which determines the main trajectories of interaction between external and internal factors in the identified categories to exclude the influence of weaknesses, maximize the neutralization of threats, and realize the potential of the university. A functional benchmarking of the effectiveness of internationalization processes was carried out using the "partner's best practice" model within the framework of the existing international partnership, using 17 indicators for seven categories of university internationalization. Work was carried out on the formation of decision matrices of the second and third levels, and the resulting matrices were based on the results of a multi-factor SWOT analysis. A total of 57 indicators were developed that determine the required measures for the development of the potential for the internationalization of the educational process in a technical university. As a part of Task iii, the results and the development of recommendations and strategies for changes identified the primary tool for implementing these strategies at a technical university: digital technologies of administration and training.

Based on the analysis results identifying important critical internal and external factors, 57 indicators of the resulting matrix were used as a basis for projecting the results of the SWOT analysis on the benchmarking algorithm. The analysis of the obtained data in a correlation matrix was carried out to determine strategic decisions and a tool for implementing the internationalization of the educational process at a technical university. As a result of the correlation analysis method of benchmarking and multivariate SWOT analysis, 17 high-efficiency methods of internationalization of the educational process and critical strategies for improving internationalization at a technical university were identified. A tool for implementing the internationalization of the educational process at a technical university was defined using digital technologies of administration and training

to build partnerships based on the mutual improvement of scholarly research, practices, and joint knowledge production.

Compared with the work of other researchers, we note several limitations in our study. When dealing with internationalization, many studies [13,33–35] differentiate their approach to diverse categories of universities. Only a few of them deal in particular with technical or other specific universities. For example, in a study by Ohajionu [35] categories of the internationalization of higher education were discussed with a focus on the perception and experience of business faculties in the internationalization of the curriculum at two universities. In contrast to the SWOT analysis used in our project, that study was based on face-to-face interviewing and coding of responses. The coding of factors in responses was used in our study for excluding double-decisions but not otherwise.

A key recommendation proposed by Malaysian universities is capacity building training for faculty to help them internationalize the curriculum [35]. In contrast, our study finds the formation of the linguistic, cross-cultural, and entrepreneurial competence of faculty and readiness for globalization through the international environment and implementation of co-learning and co-teaching strategies with the participation of foreign partners to be vital. Many studies show that universities in Malaysia use similar strategies of internationalization. For example, Aziza Kassim [13] compares the University of Malaya and the University Kebangsaan Malaysia in terms of internationalization strategies, collaboration in undergraduate and postgraduate programs, student/staff mobility, and the recruitment of international students. One of the studies using a methodology similar to the one we used in this project is from Taiwan. The study [24] suggests C (context) I (Input) P (Process) O (Outcome) indicators to collect data regarding the internationalization of different universities. Using questionnaire techniques, six important indicators were revealed: establishing distance-learning programs, promoting international research cooperation, endorsing internationalization-related courses, and promoting international learning activities in the process dimension, along with the ratio of foreign staff on campus and number of international-cooperation programs. That study suggests the following general strategies: the development of university self-strategies in internationalization, the development of international offices, funding of internationalization, and the design of indicators for monitoring internationalization at a university. In comparison, our results show that technical universities need to increase the number of international students (C), invest in adequately staffing their international affairs offices (I), establish distance learning programs (P), and increase the number of international cooperation programs (O) [16]. A limitation of the study is not focusing in-depth on the specific needs of a technical university. Further study could be dedicated to more in-depth investigations of the opportunities created by technical and industrial collaboration, such as at the Corporate University at KTU.

Author Contributions: Conceptualization, D.J.; Data curation, A.K.; Formal analysis, O.S.; Funding acquisition, D.J.; Investigation, A.K.; Methodology, O.S.; Project administration, D.J.; Resources, A.K.; Supervision, D.C.; Validation, A.K.; Visualization, O.S.; Writing—original draft, D.J.; Writing—review & editing, D.C. All authors have read and agreed to the published version of the manuscript.

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