

Implementation of Analytic Hierarchy Process for Determining Priority Criteria in Higher Education Competitiveness Development Strategy Based on RAISE++ Model

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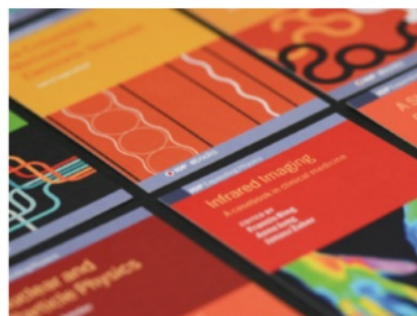
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Implementation of Analytic Hierarchy Process for Determining Priority Criteria in Higher Education Competitiveness Development Strategy Based on RAISE++ Model

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Abstract. Analytical Hierarchy Process (AHP) is a decision-making method in the decision-making system with an objective for determinant the best choice from the alternative. The alternatives would choice in this research is the priority criteria in higher education competitiveness development strategy. In this research use criteria base on the RAISE++ model are Relevance (R), Academic Atmosphere (A), Internal Management (I), Sustainability (S), Efficiency and Productivity (E), Access and Equity (+), Leadership (+). The data collecting method in this research from questioners and use SmartPLS for data analysis. Base on analysis, obtained priority criteria in higher education competitiveness development strategy use AHP method are the first priority criteria is sustainability with weights 0.555, The second priority criteria is leadership with weights 0.336, The third priority criteria is internal management with weights 0.294, The fourth priority criteria is academic atmospheres with weights 0.116, The fifth priority criteria is relevance with weights 0.103, the sixth priority criteria is access criteria and equity with weights 0.093, and the last priority criteria is efficiency and productivity with weights 0.040. Competitiveness criteria have sub-criteria of highest priority is complete infrastructure with a weight of 0.853. This research result in the criteria that are very influential in the development of higher education competitiveness is sustainability and leadership. While the higher education competitiveness criteria are influenced by complete infrastructure.

Keywords: priority of criteria, Higher Education Competitiveness, RAISE++, Analytical Hierarchy Process

1. Introduction

Analytical Hierarchy Process (AHP) is a decision-making method in the decision-making system with an objective for determining the best choice from the alternative [1]. Implementation of the AHP method is in determining priority criteria in the strategy to improve the competitiveness of Higher Education.



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Competitiveness Higher Education is capability universities to show excellence compete and offer value for its performance in a particular thing, using shows the most favorable conditions compared with other higher education. Based on it, it needed a continuous quality improvement as an amplifier competitiveness higher education. In a Systematic, effective and efficient in doing the quality of the continuous is to build a culture the quality of luminance higher education with evaluating the quality of internal is constantly.

This research aims to the implementation of a method of AHP priority in determining the criteria in the strategy the development of competitiveness higher education based RAISE++ as recommendations higher education in decision making. The criteria used in this research based on a method of raise + + namely relevance (R), academic atmosphere (A), internal management (I), sustainability (S), efficiency and productivity (E), access and equity (+), leadership (+). RAISE + + method is the theme of education that will be used as a basis for increased competitiveness in higher education because RAISE + + able to identify the main problems that frequently occur in Higher Education [2].

Research conducted by [3] the application of AHP for determining the most dominant criteria causing workload on call center operators. The criteria in this research are physical, mental, social and time. By knowing the criteria of the dominant workload, it can repair a suitable work system, so that it can improve the performance of the operator and the company.

Research conducted by [4] has limitations in determining the dominant criteria in information technology-based higher education development strategies with 4 criteria in the RAISE ++ method are Academic Atmosphere (A), Internal Management (I), Sustainability (S), Efficiency and Productivity (E). In this research uses all criteria in the RAISE++ model.

2. Literature Review

2.1 Analytical Hierarchy Process Method

Analytic Hierarchy Process (AHP) is a technical analysis supporting the decision-making process aimed at determining the best choice from many alternatives that are. AHP developed by L.Saaty in 1970s and has undergone much repair and improvement until now. Saaty trying to organize information and judgment in choosing alternatives most favored. The principle of AHP is composing a hierarchy of various criteria and the alternatives. Each criterion will be compared with the criteria another using the matrix pairs [5].

2.2 Strategy Higher Education Competitiveness

Competitiveness is one of the key elements of a national development strategy in the global economy. The competitiveness of a nation determined by the ability of the competitiveness of development of an offender, or business operators the ability of the competitiveness of the people and the ability of the state [6].

Competitiveness Indonesian in position value is lower than in neighboring countries. This can be reviewed based upon the level of technological development, the competitiveness of our country are away in position number 91 [7]. The government hopes that universities can deliver innovation economic development innovation-based knowledge and therefore increase productivity and competitiveness due to nations. It will impact on improving the economic growth and the welfare nation.

2.2 RAISE++ Concept

The theme of the development of education is relevance, academic atmosphere, Internal Management, sustainability, efficiency, leadership, and access and equity [8].

- a. Relevance, indicating the level of sensitivity the institution of higher education on the environment where those institutions are. Relevance in terms of two sides, namely the side of the quality of and readiness of the graduates in a segment of the corporate world who became the target.
- b. Academic Atmosphere, The academic conducive was required to the occurrence of an absolute interaction between lecturers and students, fellow lecturer, and fellow student.
- c. Internal Management & Organization, A commitment to improving it leads to an implementation of effective and efficient education programs.
- d. Sustainability, One strategic issue in the development of educational institutions, namely the continued existence institution which guarantees, the sustainability which guarantees quality levels made through the development, and sustainability of resources have held/invested resource.
- e. Efficiency and Productivity, Several aspects related is a timely completion of an academic program, the entire study period with a timely curriculum, the minimization of drop-out rate, and improving the quality of new students.
- f. Leadership is a relationship that affects each other in-between leaders and a subordinate who want real change that reflects a purpose.

3. Research Method

Data collection method in this research is the first sourced from the book, the internet, and previous studies of the articles and journals; second, derived from the spread of questionnaire question closed online or offline with respondents higher education in the Lampung and java with the number of respondents 100 respondents.

The steps to solve the problem determine the priority criteria in the strategy of developing higher education competitiveness using the AHP method, as follows [5]:

1. Determine the criteria and sub-criteria.

The criteria and sub-criteria in this research are based on the RAISE ++ model, namely relevance (R), academic atmosphere (A), internal management (I), sustainability (S), efficiency and productivity (E), access and equity (+), leadership (+). The criteria and sub-criteria in this study can be seen in Table 1.

Table1. Criteria and sub-criteria of the strategy of higher education competitiveness

Criteria	Sub-criteria
Relevance	<ol style="list-style-type: none"> 1. Competence graduates 2. The quality of graduates 3. Conformity curriculum 4. A graduate of a waiting period 5. Cooperation in higher education
Academic Atmosphere	<ol style="list-style-type: none"> 1. A healthy relationship between higher education and lecturers 2. Interaction between lecturers and students 3. High student affairs activities 4. The discipline of the academic community
Internal Management	<ol style="list-style-type: none"> 1. Training improved performance 2. A system of management reliable 3. Decision making rapid and efficient 4. The bureaucratic system of good 5. The utilization of resources that are effective and efficient
Sustainability	<ol style="list-style-type: none"> 1. A source of income besides the students

	2. The reputation of good management
	3. Qualified teachers
	4. Investment Strategies resources
Efficiency & Productivity	1. Study period on time
	2. The drop-out rates of low
	3. A system of a rigorous selection
	4. The ratio of lecturers appropriate criteria
	5. Finance efficiency
	6. Utility physical high
Leadership	1. Selection a good leader
	2. Quality leader
	3. Innovative leader
	4. Reputation leader
	5. Performance evaluation leader
Access & Equity	1. A source of learning complete
	2. A source of learning maintained
	3. Optimization of the utilization of learning
	4. The variation in students
	5. Facilities students other regions

2. Designing the questionnaire

The questionnaire was designed based on the criteria and sub-criteria found in the RAISE ++ model. The technique used in administering this questionnaire score uses a Likert scale technique that has answers on a scale of 1 to 10. The higher the score given means the respondent agrees more and more with the sub-criteria (closed questions) mentioned, conversely if the smaller the score is given, the more respondents disagree with existing sub-criteria. The questionnaire consisted of 39 sub-criteria with details in table 1.

3. Determination of priorities (weighting) for criteria

The results of the distribution of questionnaires were analyzed using Structural Equation Model analysis techniques with a Variance Based SEM approach, or better known as Partial Least Square (PLS). The software used in this analysis technique is SmartPLS because PLS uses a bootstrapping method or random copying. This analysis is used to get the criteria and sub-criteria weights.

4. Evaluation and Analysis

Based on the analysis of the data, then it is got the weights to each of the criteria that will determine the criteria for the most influential in the strategy the development of competitiveness higher education based on RAISE++. The criteria sustainability weights the highest so has the highest priority and the most significant impact on a strategy the development of competitiveness higher education. The weight of the criteria and sub-criteria can be seen in table 2.

Table 2. Weight of Criteria and Sub criteria

Criteria	Weight	Sub-criteria	Weight
Relevance	0,103	1. Competence graduates	0,397
		2. The quality of graduates	0,715
		3. Conformity curriculum	0,755
		4. A graduate of a waiting period	0,603
		5. Cooperation in higher education	0,664
Academic	0.116	1. A healthy relationship between higher	0,872

Atmosphere		education and lecturers	
		2. Interaction between lecturers and students	0,806 0,810
		3. High student affairs activities	0,817
		4. The discipline of the academic community	
Internal Management	0.294	1. Training improved performance	0,749
		2. A system of management reliable	0,791
		3. Decision making rapid and efficient	0,762
		4. The bureaucratic system of good	0,712
		5. The utilization of resources that are effective and efficient	0,738
Sustainability	0.555	1. A source of income besides the students	0,634
		2. The reputation of good management	0,830
		3. Qualified teachers	0,809
		4. Investment Strategies resources	0,686
Efficiency & Productivity	0.040	1. Study period on time	0,678
		2. The drop-out rates of low	0,618
		3. A system of a rigorous selection	0,634
		4. The ratio of lecturers appropriate criteria	0,620
		5. Finance efficiency	0,759
		6. Utility physical high	0,754
Leadership	0.336	1. Selection a good leader	0,826
		2. Quality leader	0,820
		3. Innovative leader	0,906
		4. Reputation leader	0,756
		5. Performance evaluation leader	0,864
Access & Equity	0.093	1. A source of learning complete	0,661
		2. A source of learning maintained	0,806
		3. Optimization of the utilization of learning	0,680 0,679
		4. The variation in students	0,311
		5. Facilities students other regions	

In addition to producing criteria and sub-criteria weights based on the RAISE ++ model, this study will analyze the weight of competitiveness criteria as shown in Table 3.

Table 3. The Weight of the Competitiveness

Criteria	Sub Criteria	Weight
Higher Education Competitiveness	1. PT become the main choice	0,824
	2. A graduate of having high competitiveness	0,772
	3. Accrediting course of study satisfactory	0,760
	4. A complete infrastructure	0,853
	5. Able to compete at the national and international	0,592

Based on the results of the data analysis , then obtained first priority in criteria development strategy the competitiveness of higher education based RAISE++, namely First priority criteria is sustainability

with weights 0.555, The second priority criteria is leadership with weights 0.336, The third priority criteria is internal management with weights 0.294, The fourth priority criteria is academic atmospheres with weights 0.116, The fifth priority criteria is relevance with weights 0.103, the sixth priority criteria is access criteria and equity with weights 0.093, and the last priority criteria is efficiency and productivity with weights 0.040. The criteria for these priorities can be seen in table 4.

Table 4. Criteria Priority

Criteria	Weight	Priority
Sustainability	0.555	Number 1
Leadership	0.336	Number 2
Internal Management	0.294	Number 3
Academic Atmosphere	0.116	Number 4
Relevance	0.103	Number 5
Access & Equity	0.093	Number 6
Efficiency & Productivity	0.040	Number 7

Second sub-criteria priority of any criteria for the development strategy competitiveness higher education based RAISE++, namely: Relevance criteria, sub-criteria priority is Conformity curriculum with weights 0.755; Academic Atmosphere criteria, sub-criteria priority is a healthy relationship between higher education and lecturers with weights 0.872; Criteria internal management with sub-criteria priority is a system management reliable with weights 0.791; Criteria sustainability with sub-criteria priority is the reputation of good management with weights 0.830; Criteria efficiency and productivity with priority is sub criteria is Finance efficiency with weights 0.759; criteria leadership with sub-criteria priority is innovative leader with weights 0.906; and criteria access and equity with sub-criteria A source of learning maintained with weights 0.806. Sub-criteria priority can be seen in table 5.

Table 5. Sub Criteria Priority

Criteria	Sub Criteria	Weight	Priority
Relevance	1. Competence graduates	0.397	Number 5
	2. The quality of graduates	0.715	Number 2
	3. Conformity curriculum	0.755	Number 1
	4. A graduate of a waiting period	0.603	Number 4
	5. Cooperation in higher education	0.664	Number 3
Academic Atmosphere	1. A healthy relationship between higher education and lecturers	0.872	Number 1
	2. Interaction between lecturers and students	0.806	Number 4
	3. High student affairs activities	0.810	Number 3
	4. The discipline of the academic community	0.817	Number 2
Internal Management	1. Training improved performance	0.749	Number 3
	2. A system of management reliable	0.791	Number 1
	3. Decision making rapid and efficient	0.762	Number 2
	4. The bureaucratic system of good	0.712	Number 5
	5. The utilization of resources that are effective and efficient	0.738	Number 4
Sustainability	1. A source of income besides the students	0.634	Number 4
	2. The reputation of good management	0.830	Number 1
	3. Qualified teachers	0.809	Number 2
	4. Investment Strategies resources	0.686	Number 3
Efficiency &	1. Study period on time	0.678	Number 3

Productivity	2.	The drop-out rates of low	0.618	Number 6
	3.	A system of a rigorous selection	0.634	Number 4
	4.	The ratio of lecturers appropriate criteria	0.620	Number 5
	5.	Finance efficiency	0.759	Number 1
	6.	Utility physical high	0.754	Number 2
Leadership	1.	Selection a good leader	0.826	Number 3
	2.	Quality leader	0.820	Number 4
	3.	Innovative leader	0.906	Number 1
	4.	Reputation leader	0.756	Number 5
	5.	Performance evaluation leader	0.864	Number 2
Access & Equity	1.	A source of learning complete	0.661	Number 4
	2.	A source of learning maintained	0.806	Number 1
	3.	Optimization of the utilization of learning	0.680	Number 2
	4.	The variation in students	0.679	Number 3
	5.	Facilities students other regions	0.311	Number 5

While the sub-criteria priority of the competitiveness criteria is a complete infrastructure with a weight of 0.853. Priority data for each competitiveness can be seen in Table 6.

Table 6. Priority sub-criteria competitiveness

Criteria	Sub Criteria	Weight	Priority
Higher Education Competitiveness	1. PT become the main choice	0.824	Number 2
	2. A graduate of having high competitiveness	0.772	Number 4
	3. Accrediting course of study satisfactory	0.760	Number 3
	4. A complete infrastructure	0.853	Number 1
	5. Able to compete at the national and international	0.592	Number 5

5. Discussion

Based on the result of this research as for several criteria that used as the design that is criteria RAISE++. The following interpretation every criterion increases competitiveness higher education:

- Relevance analysis**, show the criteria relevance has a priority number five.
This criteria state that the curriculum implemented in tertiary institutions is in accordance with the needs of stakeholders and has quality graduates so it does not require a long waiting time to get a job.
- Academic Atmosphere Analysis**, show the criteria relevance has a priority number four.
These criteria stated that higher education should have a healthy relationship between lecturer, between teachers and students, having high student activities are supported by the discipline high by any academics community.
- Intern Management Analysis**, show the the criteria internal management has a priority number three. These criteria stated that higher education often hold training to improve their performance and motivation academics community. Higher education is required to having a management system that is reliable in implementing activities tri dharma higher education.
- Sustainability Analysis**, show the criteria sustainability has a priority number one.
This criteria states that tertiary institutions have income sources that are not only derived from student funds so they can invest in strategic resources and support the continuity of their operations. Besides, universities must have a superior management system and have qualified

lecturers who are recognized by stakeholders. So it can be concluded that Sustainability is a criterion that greatly influences the strategy of developing higher education competitiveness. This criteria analysis agrees with the research conducted by [9] stated that the strategy to achieve the excellence of Private Universities in Semarang should not only be on the quality aspect of the service production process but also on the more specific aspects of service design, marketing aspects, aspects of human resource management activities, the form of infrastructure (physical buildings) and technological development.

Other research states that the mapping of competitive advantage and sustainability strategies based on performance of private tertiary institutions that can be realized through various activity programs is mapped through program activities namely improving relevance, improving academic atmosphere, improving sustainability, improving efficiency and productivity, improving leadership, and improving access and equity [10].

- e. **Efficiency & Productivity Analysis**, show the criteria Efficiency & Productivity has a priority number seven.

This criteria states that tertiary institutions must have a strict lecturer selection system so that they can produce quality students and complete their study periods on time. This will result in a low student dropout rate. Besides, tertiary institutions must have lecturer ratios according to the rules and financing efficiency.

- f. **Access & Equity Analysis**, show the criteria Access & Equity according has priority number six. These criteria said that universities have the study completed and maintained, and optimization the utilization of learning by them.

- g. **Leadership Analysis**, show the criteria leadership has priority number two.

This criteria states that tertiary institutions must have a good selection mechanism so that they can produce high-quality leaders and innovate. Leaders of higher education must have a good reputation in front of staff, lecturers, students and the community and conduct evaluations of the performance of each period. So it can be concluded, that leadership is a criterion that greatly influences the strategy of developing higher education competitiveness.

This criteria analysis agrees with the research conducted by [11] who states that the determination of personnel that considers competence, knowledge, experience and personnel attributes will be able to influence the performance and role of operational, organizational, and public leadership.

Other research, states that based on the study conducted, the results obtained that the aspects of leadership as a driving force to drive the competitiveness strengths of higher education institutions to win the competition areas so that they can get the competition results. as expected both in terms of adequate quality and quantity of students, decent income, social and cultural respect for the organization and good image [12]

The existence of a leader is mandatory because the leader will be fully responsible for every success and failure experienced by educational institutions according to the work plan that has been made [13].

- h. **Competitiveness Analysis**, shows that the criteria have sub-criteria for the competitiveness of the highest value the weight is a complete infrastructure. So we can conclude that the other thing that can affect competitiveness strategy higher education is complete facilities and infrastructures.

This analysis agrees with the statement that the quality improvement strategy is to strengthen competitiveness by forming a system development and learning quality unit, increasing the availability of educational facilities and infrastructure including the creation of an e-library [14].

6. Conclusion

Based on the analysis, it can be concluded that the criteria that greatly influences the strategy of developing higher education competitiveness is the sustainability criteria (weight value = 0.555) with the reputation of good management (weight value = 0.830) and the leadership criteria (weight value = 0.336) with innovative leaders (weight value = 0.906). In addition to the 2 (two) criteria that greatly influences the strategy of developing higher education competitiveness, other another factors can influence the strategy for high-level competitiveness, which are complete infrastructure (weight value = 0.853). So it can be concluded that tertiary institutions will be able to compete if they have a strategy and make improvements in terms of the sustainability of the reputation of good management, leadership with innovative leaders, and complete infrastructure.

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