Fuzzy Logic as A Private College Marketing Strategy in Efforts to Increase The Amount of Receipt of New Students

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ABSTRACT

The choice of marketing strategy for the Banten College of Economics (STIEB) is something that is very urgent because STIE Banten is one of the representations of higher education institutions in the field of economics which cites the name Banten as a primordial characteristic. Choosing the right marketing strategy is something that is expected and becomes an alternative for a decision that will be chosen later. The alternatives to be achieved are alternatives that contain several criteria that must be assessed based on priority. The selection of alternative strategies resulted from a SWOT analysis. The strategy development of the Banten College of Economics is faced with an ambiguous or uncertain decision so that decision makers have difficulty in determining their decisions. Usually decision makers use intuition and subjectivity only the objectives and stages of the research method. This study generally aims to develop a SWOT analysis and fuzzy logic as a marketing strategy as a solution to increasing the number of new student admissions. This research uses two analysis methods, namely: SWOT analysis In conducting a SWOT analysis, the stages of the research method carried out are as follows: Swot Method , Internal Strategy Factor Matrix, External Strategy Factor Matrix, Assessment, Swot Matrix, Fuzzy Alnalytic Hierarchy Process (F-AHP), Comparative Calculations between alternatives. The results of the analysis using FUZZY LOGIC and SWOT on the marketing strategy of the Banten College of Economics obtained a concept ideas about exploring all the potential to minimize weaknesses and use strengths to take advantage of opportunities and face threats. Based on the analysis of F-AHP in determining priority development sectors and making recommendations for marketing strategies of the Banten College of Economics.

Keywords: Fuzzy AHP, Marketing, SWOT

INTRODUCTION

The research conducted (Remunjuk, Marcus, 2005) was about Strategic Marketing Planning to create a Sustainable Competitive Advantage (Case in the UK Petra Surabaya Hospitality Management study program) Although the discussion was still general in nature, he said that competition in the higher education industry was getting tighter. Educational institutions must manage their organization like a business without abandoning its ideal aspects and must be able to transform itself into a marketing company.

In this section it is necessary to explain a description of the specific specifications associated with the scheme. With SWOT analysis and IE-Matrix, several things are suggested, namely: market intensive strategies carried out through market penetration and market development, developing differentiation strategies that show different characteristics of hotel schools, namely a unique combination of knowledge, skills, and attitude and equipped with facilities that show the hotel atmosphere throughout the lecture building so as to create a sustainable competitive advantage. Saroh, Ulfa (2008), conducted research on the Marketing Management of Private Universities in Malang. In the implementation of one private university with other private universities must compete for buyers / students, in this competition each university has its own ways to win market competition called marketing strategies. The results of the study include: (1) Two private universities are already professionals in marketing management, namely they have their own team that specifically handles marketing problems, (2) marketing strategies include market strategy, product strategy, price strategy, distribution strategy promotion strategy and customer satisfaction strategy. From all aspects of the strategy, it is almost the same in the three PTS and there are significant differences, namely the promotion strategy, especially the sales strategy. The marketing management of PTS should be thought of by a separate team that specifically handles marketing problems, led by an expert in economics or management and whose members consist of relatively permanent people so that their performance can be effective and efficient. Several processes are carried out in building strategy marketing includes a strategy to analyze the situation, a strategy to design a marketing, build a marketing program, and a strategy to implement funds to manage marketing (Cravens, 2006). A situation analysis strategy is indispensable in the initial steps of building a marketing strategy. In this process, an analysis of the market is carried out, including defining buyers and competitors, analyzing the market and predicting how the business and marketing plans will go forward. After analyzing the market, the next step is to segment the market. Market segmentation is done to see the needs and wants of buyers in the market.

LITERATURE REVIEW

Marketing Strategy through FUZZY LOGIC

A good business if the business has a good strategy for running its business. According to Freddy Rangkuti (2009: 18) SWOT analysis is a systematic identification of various factors to formulate a company strategy. This analysis is based on logic that maximizes strengths and opportunities (Opportunities), but simultaneously minimizes weaknesses and threats (Threats). The strategic decision-making process is always related to the development of the company's mission, objectives, strategies and policies. . Thus, strategic planning (strategic planner) must analyze the company's strategic factors (strengths, weaknesses, opportunities, and threats) in the current conditions. This research shows that company performance can be determined by a combination of internal and external factors. These two factors must be considered in a SWOT analysis. SWOT stands for Internal Strengths and Weaknesses environment and External Opportunities and Threats environment facing the business world. SWOT analysis compares the external factors, opportunities and threats with internal factors: Strengths and Weaknesses. F-AHP is one of the ranking methods. F-AHP is a combination of the AHP method with a fuzzy concept approach (Raharjo et al., 2002). F-AHP covers the weaknesses found in AHP, namely problems with criteria that have more subjective characteristics. The uncertainty of numbers is represented by an order of scale. To determine the degree of membership in the F-AHP, a function rule in the form of a triangular fuzzy number (TFN) is used which is arranged based on a linguistic set. Thus, the numbers on the level of importance of the AHP are transformed into the TFN scale set.

Fuzzy Logic Consists of 3 (three) stages, namely the fuzzification process, the inference system (rule base), and the defuzzification

process. The fuzzification process in determining the membership set of 4 (four) physical sustainability factors and the level of physical continuity uses ascending, descending, and triangular linear membership functions. Linear curves are used because the value of the level of sustainability changes up and down linearly. The process of determining the rule base uses the Delphi method. The Delphi method is an analytical method used to collect, select, and draw conclusions from the speakers using an iterative commissioner. The Delphi method is used so that the combination of sustainability factor values in forming the level of sustainability is objectively formed. The operation of the fuzzy expert system has 4 stages in Mamdani inference (including the Tsukamoto and Sugeno methods), these stages:

1. Formation of fuzzy sets (fuzzyfication) Input and output variables are divided into one or more fuzzy sets 2. Application of the implication function The implication function used is the MIN set and the correlation between the rules. There are 3 kinds: MAX, ADDITIVE, and probabilistic OR (probor) 3. Composition (compounding) rules. Inference is obtained from the collection and correlation between rules. There are 3 types: MAX, ADDITIVE, and probabilistic OR (probor) 4. Confirmation (defuzzyfication) The input here is a fuzzy set obtained from the composition, fuzzy rules, the output is a crisp value.

Market Research for Higher Education Service Providers The process of seeking input from consumers can be carried out with various forms of market research, the results of which can be used by private universities to design vocabulary of attributed and benefits products (Assael, 1995). Cohen (1995) states that searching for various kinds of input from consumers regarding the features and benefits of the product is called a process of collecting voice of the customer. This process is carried out through a research effort to: (a) listen to what consumers say about a product and try to capture unstructured consumer statements, (b) sort different types of consumer comments into categories (dimensions), and (c) using one of the dominant categories that represent the needs and desires of consumers to be developed. This research is directed to explore the determinants of selection

PTS by prospective students (voice of the customers) which can be controlled by PTS (marketing stimuli) and testing how much these factors play a role in the choice of PTS (product / brand choice).

METHOD

Methods include research design, population and sample, development of research instruments, data collection techniques, and data analysis techniques, described briefly.

The stages in this research implementation stage are as follows:

1. **The SWOT method**
   SWOT analysis is the systematic identification of various factors for formulating a marketing strategy. This analysis uses the (Strentght) and opportunities (opportunities but simultaneously can minimize weaknesses (Weakness) and threats (Threats).

2. **Internal strategy factor matrix**
   Before doing the SWOT matrix it is necessary know first internal factors (IFAS) ifas stands for Internal Strategic Factor Analysis Summary.

3. **External strategy factor matrix**
   Before creating a SWOT matrix, it is necessary know the external strategy factor (EFAS).

4. After grouping several internal and external factors, the next step is doing an assessment. Based on the questionnaire data distributed on Respondent weights are calculated from 0.0 (not important) to 1.0 (very important) the number of weights on strength and weaknes is 1.00, as well as The amount of opportunity and threat weight is also 1.00.

5. **SWOT Matrix** After completing the analysis of the IFAS and EFAS strength and threats

matrices, the tool used to compile the marketing strategy factors of the Banten Institute of Economics is the SWOT matrix.

Fuzzy Analytic Hierarchy Process (F-AHP) The solution to the problems in this study is not only using quantitative data, but also qualitative data. Qualitative data. The method or means to achieve the stated goals should not exceed 600 words. This section is equipped with a research flow chart that illustrates what has been implemented and will be done during the proposed time. The flow chart format can be JPG / PNG files. The research chart must be made in its entirety with clear phases, starting from the beginning, how the process and its outcomes are, and the indicators of targeted achievement. In this section, you must also fill in the duties of each member who proposes according to the proposed research stage. After completing the analysis of the IFAS and EFAS strength and threats matrices, the tool used to compile the marketing strategy factors of the Banten Institute of Economics is the SWOT matrix.

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Obtained from the data from filling out the questionnaire form conducted by the correspondent. F-AHP can solve complex problems into its elements easier to solve through structuring a hierarchy. In structure hierarchy there are three levels, where level 1 is a priority based on factors SWOT. Level 2 is the criteria and sub-criteria derived from the results of the SWOT analysis which was discussed earlier. While level 3 contains alternatives consisting of the four conditions of the strategy. In making decisions on marketing strategies determined based on the fulfillment of the weight of each of the criteria and alternatives.

The criteria and sub-criteria are obtained from the results of the SWOT analysis that have been discussed previous. Connecting lines between elements indicate a relationship between elements. After doing the hierarchical structure arrangement, it is done weighting of each element using the F-AHP calculation. Weighting

This aims to determine the weight of each criterion against the criteria and alternative assuming there is no dependency relationship between criteria. The scaling of the alternatives was performed by simulating the assignment of scores for each alternative using importance based intensity subcriteria Determine the value of fuzzy synthesis.

6. **Comparison between Alternatives**

In this study, there are four alternatives. Comparison between alternatives is calculated for each factor in the criteria of strengths, weaknesses, opportunities and threats.

RESULT and DICUSSION

SWOT Matrix Calculation

The marketing strategy of the Banten College of Economics is determined by a SWOT analysis. According to Rangkuti (2015) SWOT stands for the internal environment for Strengths and Weaknesses and the external environment for Opportunities and Threats that the business world faces.

The SWOT analysis model is based on logic by maximizing strength (strength) and opportunities (Opportunity), and at the same time minimizing weakness (weakness) and threats (threats). By knowing the internal factors, namely (strengths and weaknesses) when reducing weaknesses and at the same time maximizing

strengths. On external factors, namely (opportunities and threats) when minimizing the threat, it can be magnified by opportunities.

1. Internal factors
a. Strengths (Strength) on the campus of the Banten College of Economics include:
   1) The location of the campus in the middle of the city is strategic and easily accessible
   2) Prodi accreditation is good.
   3) The fighting spirit and commitment of the lecturers and staff in the dictionary in providing servants is very high.
   4) Very affordable semester campus fees
   5) Long established private universities and the name PTS has given trust to the community

b. Weaknesses on the Banten College of Economics campus includes:
   1) There are still multiple positions and no employment provisions
   2) Lack of student achievement
   3) Worship infrastructure is not good
   4) Information system technology is still weak, thus hampering service and reporting
   5) Sources of funds are still limited, making it difficult to increase activities that require large funds, such as training promotions etc.

2. External Factors
a. The opportunities that exist on the campus of the Banten College of Economics (STIEB) includess:
   1) The first private university that has been accredited B
   2) Hereditary tradition has entered the STIE Banten campus
   3) Cooperation between the campus and alumni
   4) Scholarship opportunities
   5) Uptake of alumni by the world of work and business

b. The threats that exist on the campus of the Banten Institute of Economics (STIEB), includes:
   1) Insufficient facilities and infrastructure can inhibit the interest of prospective new students
   2) Tight government regulations
   3) The demand to be able to produce technology literate graduates in order to produce technology-based businesses
   4) Other private universities that are consistent with quality and have big names.
   5) Competition is getting tougher with the increasing number of universities growing in the city of Serang.

Tabel 1. Marketing Strategy Factors of Banten College of Economics

External Strategy Factors	Rating	Weight	B x R	Internal Strategy Factors	Rating	Weight	B x R
Opportunies				Strenght			
Op1	3	0,09	0,24		4	0,10	0,38
Op2	3	0,10	0,31		4	0,10	0,38
Op3	3	0,10	0,35		4	0,10	0,40
Op4	4	0,11	0,41		4	0,10	0,37
Op5	3	0,10	0,34		4	0,10	0,38
Total Opportunies			1,65	Total Strenght			1,91
Threats				Weaknesses			
Th1	4	0,11	0,43		4	0,10	0,38
Th2	4	0,11	0,43		4	0,10	0,35
Th3	2	0,06	0,13		3	0,09	0,28
Th4	3	0,10	0,31		4	0,10	0,35

Th5	4	0,11	0,39		4	0,10	0,38
Total Threats			1,69	Total Weaknesses			1,75
Total		1	3,34	Total		1	3,66

According to Tabel 1 EFAS Matric, shows that the weight of the marketing strategy rating of the Banten College of Economics, the external strategy factor is obtained from the total opportunity score of 1.65 and the total threat score of 1.69 so that the total score of external factors is 3.34. The total value of the whole shows that how the marketing strategy of the Banten Institute of Economics (STIEB) reacts to external factors.

According Tabel 1 IFAS Matric, shows that the weight of the marketing strategy rating of the Banten College of Economics, the internal strategy factor is obtained from the total strength score of 1.91 and the total weakness score of 1.66 so that the total score of the internal factors is 3.66. The overall total value shows that how the marketing strategy of the Banten Institute of Economics reacts to its internal factors.

3. SWOT Matrix

In the development of these 4 types, the SWOT matrix is used, namely SO, WO, ST and WT. The key to the successful use of this SWOT matrix is to bring together internal and external key factors in forming 1 strategy.

1. SO strategy is a strategy that uses internal campus strengths to take advantage of external opportunities and benefits.
2. The WO strategy is a strategy designed to exploit internal weaknesses and exploit external opportunities. This WO strategy also shows the opportunities that are within reach that can be reached by the campus if it is successful in correcting internal weaknesses.
3. ST strategy is to anticipate external threats by using internal strength.
4. The WT strategy is an organization that deals with weaknesses and threats that cannot be handled by using existing strengths and opportunities. In fact, the form of implementation of the WT strategy is a merger, bankruptcy, restructuring or liquidation.

The results of the SWOT Analysis, below:

Tabel 2. Marketing Strategy SWOT Matrix

IFAS / EFAS	S = 1,91	W = 1,75
O = 1,65	SO = 3,56	WO= 3,40
T = 1,69	ST = 3,60	WT = 3,44

Based on table 2, the strategic priorities are arranged based on the combination of strategies that have the highest to the lowest values, as shown in table 3 below:

TabeL 3. Alternatives to the SWOT Strategy

Priority	Strategy	Weighted Value
1	Weaknesses-Opportunies (WO)	3,40
2	Strenght-Opportunies (SO)	3,56
3	Weaknesses-Threats (WT)	3,44
4	Strenght-Threat (ST)	3,60

Based on the table. 3 sequences of SWOT strategy alternatives, that Strength-Threats (ST) produces the highest weight, which is a strategy that utilizes all strengths to seize and take

advantage of the greatest threat. There is great competition between private universities in the city of Serang and very strict order regulations, the STIE Banten campus must develop qualified human resources with good training in research and learning methods so that they can unravel the competition for their human resources. and inviting alumni who have worked to promote competitive advantages that exist in the real world.

Fuzzy Logic Calculations
The data that will be entered into the set of fuzzification process is the value frequency multiplied by the number of respondents from each choice. Then defuzzification is generated from the average value of the results of the fuzzification process to obtain a single value.

1. **Calculation of Fuzzification and Defuzzification of Opportunies Perhitungan Fuzzifikasi dan Defuzzifikasi Opportunies**

Tabel 4. Opportunies Calculation

No	Attribute	Triangular Fuzzy Number (TFN)			Defuzzifikasi
		c	a	b	
1	OP.1	1,80	2,80	3,70	2,76
2	OP.2	2,20	3,20	3,95	3,12
3	OP.3	2,36	3,36	3,96	3,23
4	OP.4	2,67	3,67	4,00	3,45
5	OP.5	2,32	3,32	3,95	3,20

From Table 4, the Opportunies level or opportunities that have the highest defuzzification value is the Opport.4 attribute with a value of 3.45, while the Opportunies level or opportunities that have the lowest defuzzification value is the Opport attribute with a value of 2.76.

2. **Calculation of Fuzzification and Defuzzification Threats.**

Tabel 5. Calculation Threats

No	Attribute	Triangular Fuzzy Number (TFN)			Defuzzifikasi
		c	a	b	
1	Th.1	2,73	2,73	4,00	3,49
2	Th.2	2,74	3,74	4,00	3,49
3	Th.3	1,26	2,06	3,05	2,12
4	Th.4	2,20	3,20	3,95	3,12
5	Th.5	2,57	3,57	3,99	3,38

According to Table 5, the level of threats or threats that have the highest defuzzification value is the attribute Th.1 and Th.2 with a value of 3.49, while the Threats level or threat that has the lowest defuzzification value is Th.3 attribute with a value of 2.12.

3. **Calculation of Fuzzification and Defuzzification Strenght.**

Tabel 6. Strength calculation

No	Attribute	Triangular Fuzzy Number (TFN)			Defuzzifikasi
		c	a	b	
1	St.1	2,73	3,73	4,00	3,49
2	St.2	2,75	3,75	4,00	3,50
3	St.3	3,80	3,80	4,00	3,53

| 4 | St.4 | 2,68 | 3,68 | 3,97 | 3,44 |
| 5 | St.5 | 2,74 | 3,74 | 4,00 | 3,49 |

According to Table. 6 Strenght Level or Strength that has the highest defuzzification value is attribute St.3 with a value of 3.53, while the strength level or strength has the lowest defuzzification value is attribute St.4 with a value of 3.44.

4. Calculation of Fuzzification and Defuzzification Weaknesses.

Tabel 7. Calculation of Weaknesses

No	Attribute	Triangular Fuzzy Number (TFN)			Defuzzifikasi
		c	a	b	
1	Wk.1	2,74	3,74	4,00	3,49
2	Wk.2	2,59	3,59	4,00	3,39
3	Wk.3	3,20	3,20	3,95	3,12
4	Wk.4	2,57	3,57	3,99	3,38
5	Wk.5	2,75	3,75	4,00	3,50

According to Table 4.1, the level of weaknesses that has the highest defuzzification value is the Wk.5 attribute with a value of 3.50, while the level of weaknesses that has the lowest defuzzification value is the Wk.3 attribute with a value of 3.12.

CONCLUSION

The paradigm of educational development and the existence of regulations have had a lot of impact on private universities. In higher education studies, HR issues are crucial in increasing the competitiveness of higher education. The quality of lecturers and the effectiveness of educational staff are the main things to improve the competitiveness of higher education, also in terms of increasing the competitiveness of college graduates because the quality of college graduates is one of the indicators to assess the competitiveness of a university. It is clear that in higher education there is a series or set of management, factors, policies and institutions. All of these are the strong foundations of a college. The factor in question is the human factor, namely students who are in a university environment. Various issues and various internal and external conditions that exist within private tertiary institutions have positive and negative impacts which, when analyzed, can be an effective strategy for the future development of private universities. Through SWOT analysis and Fuzzy Logica, it will be useful to determine strategic choices in understanding the potential of private universities to survive in the era of globalization in the future.

REFERENCES

Aggy dkk.2017.Fuzzy Logic Dalam Menentukan Strategi Pemasaran Umkm (Usaha Mikro Kecil Menengah), Jurnal Teknologi Vol. 7, No. 2, Hal. 220-229 E- ISSN : 2541-1535 ISSN : 2301-4474

Barliansah,2020 Analisis Rantai Pasok Pariwisata (Tourism Supply Chain) Dengan Pendekatan Fuzzy Logic Di Kota Bandung. ISSN 2087 – 9245

Alibrandi, Joseph F. 1990. "Century 21 Education: A Plan for Excellence." Executive Speeches,June.

Assael, Henry, 1995. Costumer Behavior And Marketing Action, Keat Publishing Company, Boston.

Bergin, Sarah. 1997. "Communication is the Key to Customer Success." Transportation & Distibutian, March.

Cohen, L. (1995), Quality Function Deployment: How to Make QFD Work for You, AddisonWesley, Inc., Massachusetts.

Craven, David W & Nigel F Priecy, 2006, Stategic Marketing, International Edition, McGraw – Hill.

Hanssens, Dominique M. (1996), "Customer Information: Building A Strategic Asset." Chief Executive (May), p. 66-67.

Jasril, Haerani, E., & Afrianty, L. (2009). Sistem Pendukung Keputusan (Spk) Pemilihan Karyawan Terbaik Menggunakan Metode Fuzzy Ahp (F-Ahp). Seminar Nasional Aplikasi Teknologi Informasi 2011, 2011(Snati 2011), 17–18

Kotler, Philip (2004). Marketing Management, The Millenium Edition. Englewood Cliffs, New Jersey : Prentice Hall.

Kartajaya, Hermawan. 1994. "The Strategic Marketing Plus 2000 Conceptual Framework." Swa, Edisi Khusus IV, Agustus.

Mardison.2012."Sistem Pendukung Keputusan Dalam Pencairan Kredit Nasabah Bank dengan Menggunakan Logika Fuzzy dan Bahasa Pemograman Java".

Marcus Remiasa. 2005. Perencanaan Strategis Pemasaran untuk menciptakan Sustainable Competitive Advantage (Kasus pada program studi manajemen Perhotelan UK Petra Surabaya). Jurnal Manajemen Perhotelan, Vol. 1, No. 1, Maret 2005: 14-23.

Rangkuti, Freddy. (2009). Strategi Promosi yang Kreatif dan Analisis Kasus Integrated Marketing Communication. Jakarta, PT. Gramedia Pustaka Utama.

Simonson, Itamar. 1993. "Get Closer to Your Customers by Understanding How They Make Choices." California Management Review, Summer.

Setyaningsih, Wiwik., Iswati, T Yuni., Yuliani,Sri. 2014. Low-Impact-Development as an Implementation of the Eco-Green-Tourism Concept to Develop Kampung towards Sustainable City. Procedia - Social and Behavioral Sciences (179) 2015, hlm 109-117.

Evaluasi Tingkat Keberlanjutan Fisik dengan Fuzzy Logic (Ridhoni, et al.)

Syahid, A Ahmad. 2013. Desain kurikulum pelatihan untuk meningkatkan kompetensi penyusunan bahan ajar. UPI. Bandung

Ulfa, Saroh. 2008. Tesis: Manajemen Pemasaran Perguruan Tinggi Swasta di Malang (Studi Kasus Di Unmer, Universitas Kanjuruhan dan Unisma), UIN Malang.