DECISION SUPPORT SYSTEM FOR SELECTING STRATEGY OF AGROINDUSTRY DEVELOPMENT BASED ON "TAPE" IN BONDOWOSO REGENCY

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Abstract. The strategy selection of agroindustry development based on "tape" in Bondowoso Regency is a complex problem, this is caused by several alternative decisions that must be chosen, even though each alternative contains several criteria that must be assessed based on its priorities. This alternative selection is based on a SWOT analysis of agroindustry development basef on Tape in bondowoso regency. The development of agroindustry based on tape is faced with complex and uncertain situations, so that decision makers have difficulty in determining decisions. Decision makers usually use intuition and subjectivity only. Fuzzy-Analytic Hierarchy Process (Fuzzy AHP) approach is one method that can answer this problem. This method can guide decision makers to make an assessment of each criterion and alternative. The criteria used in this study are (S) = Strengths, (W) = Weaknesses, (O) = Oppurtunities, (T) = Treats.

Keywords: Fuzzy; AHP; SWOT; Bondowoso Regency

Introduction

Potential food plants that can push the economic development of Bondowoso Regency are rice, corn, cassava / cassava, green beans, peanuts, soybeans, vegetables and fruits. Rice is the main agricultural product which has the highest harvested area and total production, corn is on the second place and then followed by cassava [1].

Cassava commodities become potential product for Bondowoso Regency. This potential product has encouraged farmers and communities in Bondowoso Regency to process and create an added value of cassava to increase their income. According to the results of research [4], the potential processed cassava that can be regional superior products, is tape and its processed. Processed products based on tape in Bondowoso Regency are so numerous,so the availability of tape becomes very meaningful for some agro-industries that produce products based on tape in Bondowoso Regency.

The existence and availability of tape must be maintained, so that some agro-industries based on tape will still be able to fulfill the consumer demand in the market. Therefore, a study is needed to analysis the development of tape agroindustrial strategy in Bondowoso Regency, because during this time it has not been studied and its development is known in the future. Therefore, this analysis can be obtained or formulated the steps or strategies that need to be taken to support the development of a tape-based agroindustry in Bondowoso district.

Research Methods

Mind Frame

The strategy formulation of an organization and industry always follows the dynamics of the internal and external strategic environment that is aligned with the mission of the organization / industry. The internal environmental monitoring of an industry related to the strengths and weaknesses aspects of an industry's resources, While external environmental monitoring covers the opportunities and threats of

customer needs of the service users and goods.The emergence of competitors, the dynamics of social, political, and subsequent technological developments are analyzed with the SWOT matrix to get the choice of strategies, then the best strategy will be chosen according customer expectations by using the Fuzzy AHP method. Bondowoso Regency is a city which is famous for its tape and various kinds of processed tapes as its signature food. However, if it is reviewed the availability of raw materials and its marketing development is still experiencing uncertainty, so it is necessary to study the analysis of policy strategy on the development of agroindustrial tape in Bondowoso district.The research framework scheme is illustrated as in Fig.1
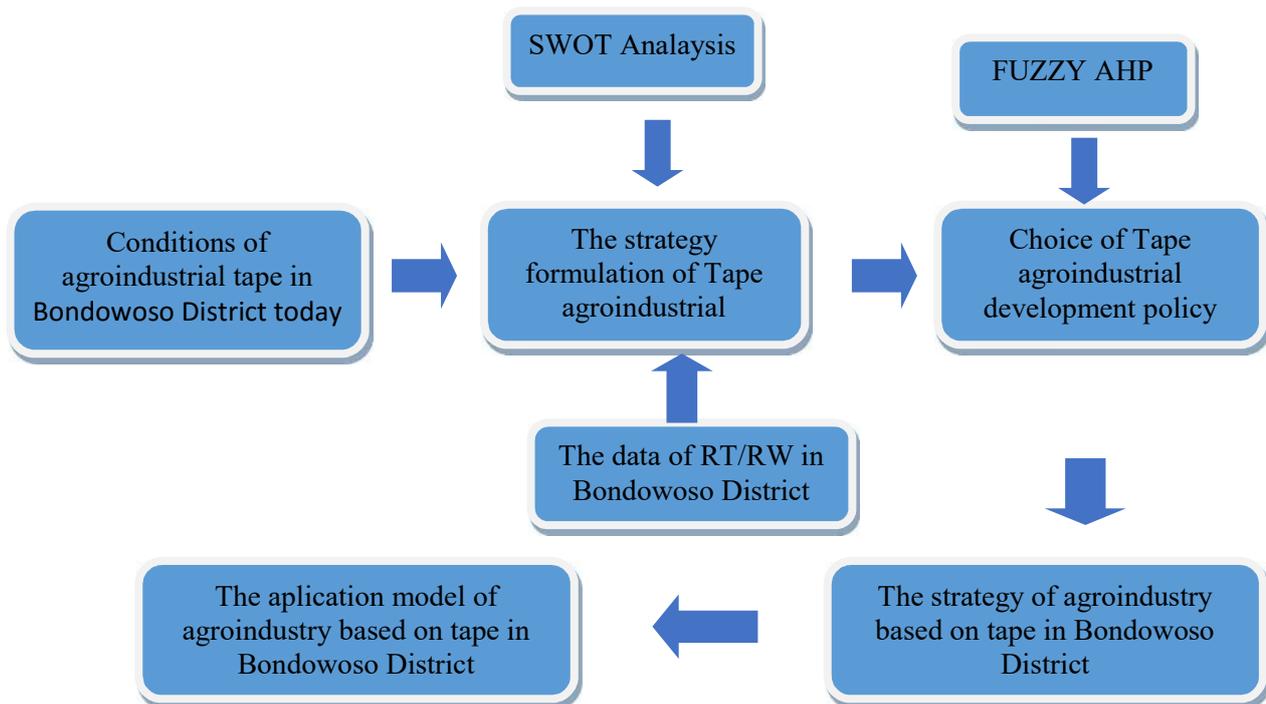

Fig. 1 Mind Frame

Types and Variables of Data Research
Types of data collected in the form are qualitative and quantitative data, both primary and secondary data(Suliyanto, 2006). Data collection in this study was obtained from two data sources, namely: (a) primary data, obtained directly by respondents by sending questionnaires or go to respondents and conduct structured interviews. (b) secondary data, obtained from relevant agency documentation, previous research data on tape-based agro-industry.

Reliability and Validity Test.
Arikunto (2002) states that the validity test is used to measure the level of validating or validity of an instruments.Validity test is done by correlating each item in a variable with a total score using the product moment correlation technique. The correlation coefficient is said to be valid if the probability value r arithmetic ≤ 0.05 (r ≤ 0.05).
Kerlinger (2000) states that reliability is stability, consistency, predictability or predictability, and clarity or accuracy. Reliability is the extent to which the results of a measurement can be trusted. Testing the reliability of measuring instruments using the Cronbach Alpha technique. If the alpha coefficient ≥ 0.6 can be stated that the questionnaire instrument used is reliable (Malhotra, 1999).

Data Processing And Methods Analysis

The methods of processing and analyzing data are Fuzzy-Analytic Hierarchy Process and Strength, Weakness, Oppurtunity and Threath (SWOT). The SWOT method isused to determine the evaluation of development by analyzing external and internal factors affecting the agroindustrial tape. The FAHP method isused to determine the priority of the development of a tape-based agroindustrial development strategy in Bondowoso.

SWOT analysis (Strength, Weakness, Opportunity, Threat) is an analytical tool used to identify various factors that are influential in formulating strategies [6]. The qualitative approach of SWOT analysis generates analternative strategy that can be taken by the company by looking at the relationship of SWOT factors [7]. Alternative strategies have different ways to improve the performance of anorganization [8].

The F-AHP is a combination of AHP methods and fuzzy concept approach (Raharjo etal, 2002). F-AHP covers the weaknesses found in AHP, which is the problem of criteria that have more subjective properties. The number uncertainty is represented by a scalesequence. The determination of the F-AHP membership degree developed byChang (1996) uses the Triangle membership function (TriangularFuzzyNumber/TFN). The triangle membership functionis a combination of twolines (linear). Graphs of thetriangle membership functions are depicted in a triangular curve shape as seen in Figure 2.
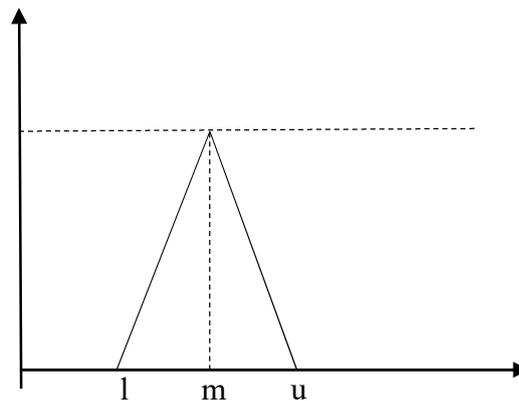

Fig.2 Triangle Membership Function (Chang, 1996)

Results and Discussion

Based on the test results, it is known that the relationship between the item score and the total score has a probability R count (p) $\leq$ 0.05 so that the relationshipis valid. The relationship between items in a variable can be known through Alpha Cronbach with a correlation coefficient that is above the reliability coefficient that has been set at 0.6 so that it can be concluded that the relationship is reliable.

IFE Matrix (Internal Factor Evaluation)

Based on the interview and validation there are 13 indicators that are the internal indicators (strengths and weaknesses) of the agro-industrytape in Bondowoso district. Based on the calculations contained in Table 1, there can be known total internal matrix strength is 1.49 and total internal matrix weakness is 1.52 so that the total internal matrix score is 3.01.

Table 1. Internal Matrix Factor of Tape Agroindustry in Bondowoso District

NO	INTERNAL DOMINANT FACTOR	Total	Rank	Wheigts	Wheigts x Rank
	STRENGTHS				
1	Taste and Quality of Product	5	1	0,04	0,05
2	The existence of supporting operation activities	6	2	0,05	0,07
3	Industry Experience	13	3	0,10	0,32
4	Product practicality (easy to carry)	13	3	0,10	0,32
5	The existence of packaging labelization	11	3	0,08	0,23
6	There is already a job description	16	4	0,12	0,48
7	Customer loyalty	4	1	0,03	0,03
NO	WEAKNESSES	Total	Rank	Wheigts	Wheigts x Rank
1	Limited funding source	11	2,75	0,08	0,23
2	Lack of promotion	12	3,00	0,09	0,27
3	Product not optimal	15	3,75	0,11	0,42
4	The technology used is still simple	5	1,25	0,04	0,05
5	Low education level of worker	16	4,00	0,12	0,48
6	Products are easily damaged	6	1,50	0,05	0,07
	Total	133		1,00	3,01

EFE Matrix (*External Factor Evaluation*)

Based on the interview and validation, there are 11 indicators that are external indicators (opportunities and threats) of agro-industry tape in Bondowoso district. Based on the calculations on Table 2, there can be known total external matrix of opportunities of 1.80 and the total matrix of external threats of 1.11 so that the total overall external matrix score of 2.92.

Table 2. External Matrix Factor of Tape Agroindustry in Bondowoso District

NO	EKSTERNAL DOMINANT FACTORS	Total	Rank	Wheigts	Wheigts x Rank
	OPPORTUNITIES				
1	Advanced technological developments	13	3	0,12	0,38
2	There is an image as a typical regional food	7	2	0,06	0,11
3	Open markets in and out of the country	14	4	0,13	0,44
4	Population growth is getting higher	16	4	0,14	0,57
5	Training and coaching from local governments	11	3	0,10	0,27
6	The presence of a fixed raw material supplier	4	1	0,04	0,04

NO	THREAT	Amount	Rank	Wheigts	Wheigts x Rank
1	Fluctuating production costs	4	1,00	0,04	0,04
2	Raw materials are difficult to obtain	7	1,75	0,06	0,11
3	Raw materials are seasonal	11	2,75	0,10	0,27
4	The less strategic Bondowoso region	12	3,00	0,11	0,32
5	Substitution product	13	3,25	0,12	0,38
	Total	112		1,00	2,92

IE Matrix for Positioning

The values that have been obtained from the IFE and EFE matrices will be inserted into the Internal-external matrix to map the agroindustrial tape position in Bondowoso County. This Internal-External matrix positions the production in a nine-cellview. The IE matrix is based on two key dimensions that are total IFE weight scores on the X axis and the EFE weight score on the Y axis. Based on the IFE matrix and the EFE can be known Position on the X axisat 3.01 point and the Y axis position at 2.92 Point.
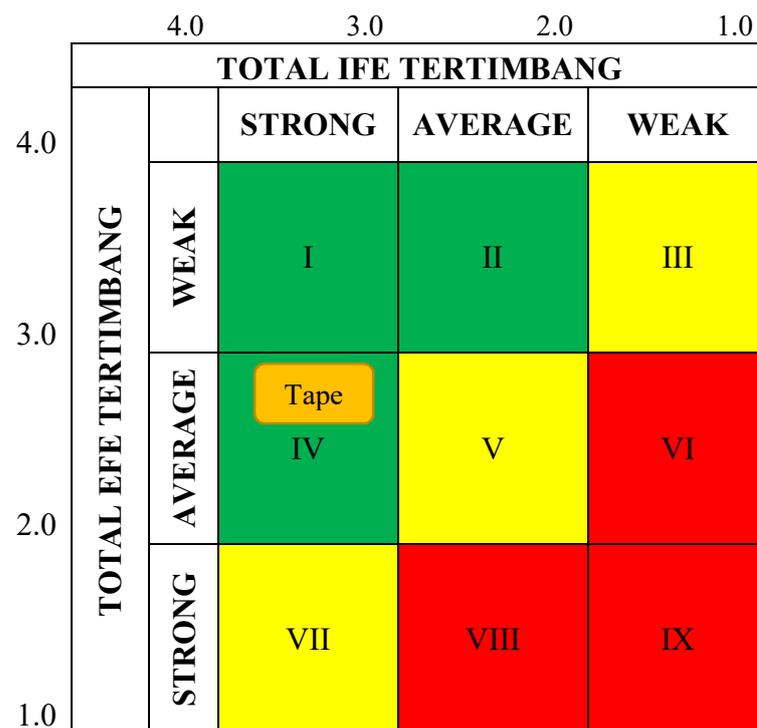

Figure 3. IE Matrix

SWOT Matrix

The SWOT matrix is the tools used in helping determine the strategy by considering strengths, weaknesses, opportunities and threats. The SWOT matrix consists of the SO (Strengths Opportunities) strategy, the WO (Weakness Opportunities) strategy, the ST strategy (Strengths Threats) and the WT (Weakness Threats) strategy. Based on the analysis through IE matrix, it can be obtained that the agroindustrial tape in Bondowoso Districtis in Quadrant IV. In which the company is in the 4th quadrant including the company that is described as being the grow and build region. Intensive strategies (market

penetration, market development, and product development) or integrative strategies (backwards integration, fore integration, and horizontal integration) are the right strategyforthe region [4]. The quadrant is perfect for implementing a strategy like Table 3.

Tabel 3. Matriks SWOT Analysis

EFAS IFAS	S	W
O	Expanding marketing area and improving service quality to consumers	Conducting promotional activities through mass media and optimizing the production amount
T	Develop a product of processed tape and improve quality and value added products	Improve the quality of human resources in technology and management and to performing cost efficiency of production

F – AHP

The alternative selection of a tape-based agroindustrial development strategy in Bondowoso district based on FAHP method consists of three levels. Each of levels, the rationale will be outlined in Figure 4.0
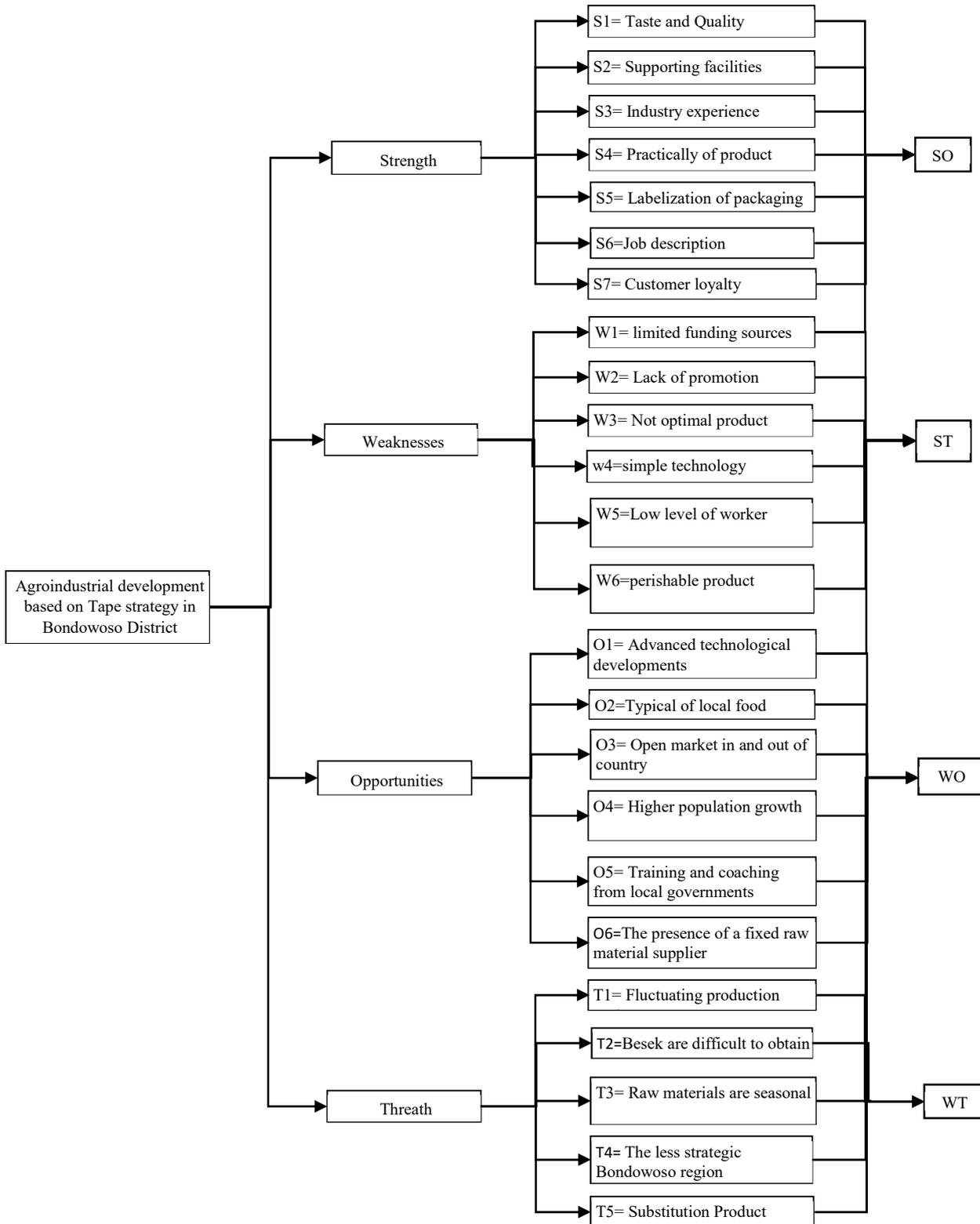
Figure 4. Hierarchical structure of SWOT analysis

Tabel 5. Fuzzy pair-wise comparasion of SWOT factors

	S	W	O	T	Σ M
S	(1,1,1)	(0.33,0.61,1)	(0.5,0.83,1)	(0.33,0,61,1)	(2.17,3.06,4)
W	(1,1.64,3)	(1,1,1)	(1,2,3)	(0.5,0.83,1)	(3.5,5.47,8)
O	(1,1.2,2)	(0.33,0.5,1)	(1,1,1)	(0.5,0.83,1)	(2.83,3.37,5)
T	(1,1.64,3)	(1,1.2,2)	(1,1.5,2)	(1,1,1)	(4,5.34,8)

After the weights are obtained, the weights are added up to produce a global weight of each alternative,after the global weight and ranking is obtained then it is searched for the average fuzzyweight of AHP from each alternative and normalized value to determine the rankings of each alternative, the process of the application is shown in Figure 5.
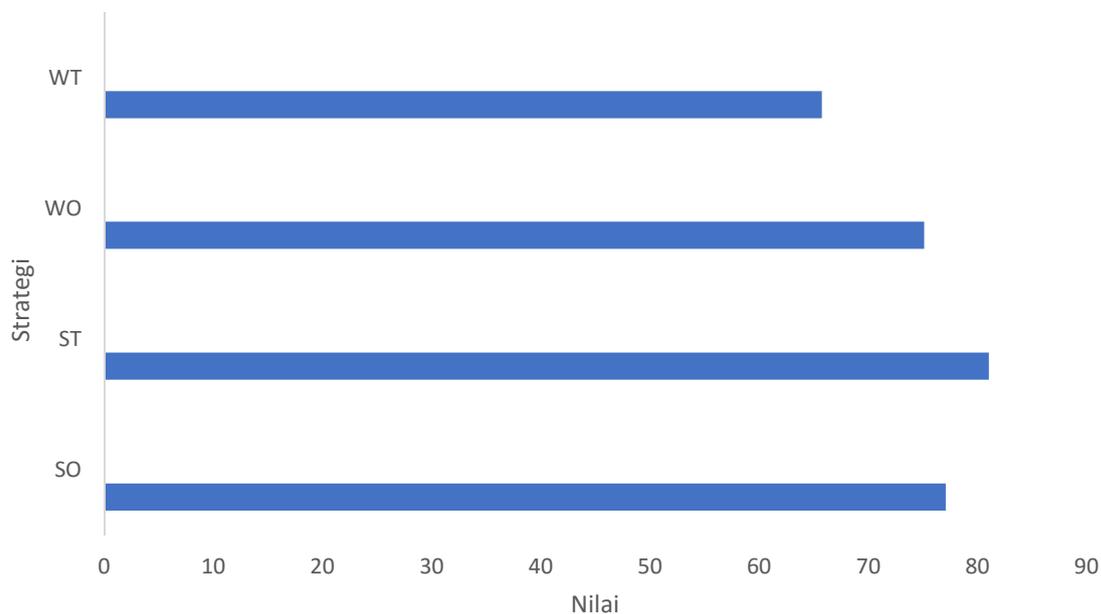
Gambar 5. Ranking of Alternative Strategy options

Based on the F-AHP analysis in determining the priority sectors of development and to make recommendations of agroindustrial based on Tape development strategy in Bondowoso. Results running from FAHP model implementation is obtained that the criteria that become the main consideration is the result of the SWOT analysis, the strategy that is the main choice priority is driving strength in overcoming the threat (ST) that is doing Product development and improve product quality and value added.

Conclusion
SWOT – FAHP method is one way to combine each SWOT element with FAHP, so it can be obtained more detailed and comprehensive analysis of each of the SWOT elements. The results of each SWOT element study showed that agroindustrial based on Tape position in Bondowoso District using a simulated model currently resides in the 4th quadrant. The main srategy priority is to encourage strength in overcoming the threat (ST) and develop the processed tape products by improving the quality and value added products.

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