

PAPER • OPEN ACCESS

Decision Support System For Selecting Strategy Of Agroindustry Development Based On “Tape” In Bondowoso Regency

To cite this article: D Hermanuadi *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **411** 012016

View the [article online](#) for updates and enhancements.

Decision Support System For Selecting Strategy Of Agroindustry Development Based On “Tape” In Bondowoso Regency

D Hermanuadi¹, A Brilliantina² and E K Novitasari¹

¹Department of Agricultural Engineering, State Polytechnic of Jember
Mastrip Street PO BOX 164 Jember, Indonesia

²Department of Food Industry, State Polytechnic of Jember
Mastrip Street PO BOX 164 Jember, Indonesia

E-mail: elok_kurnia@polije.ac.id

Abstract : Cassava is one of the most highly productive food crops in Bondowoso regency. High productivity of cassava, encourages farmers and communities in Bondowoso regency to make product from cassava. One form of processed cassava with high selling power is Tape. Because Tape has high demand, so the existence and availability of tape must be maintained. Based on this, it is necessary to study the analysis of agro-industry Tape development strategy in Bondowoso Regency. The main purpose of this research is to obtain the steps or strategies that support the development of agro-industry Tape development in Bondowoso Regency. 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. The results showed that the position of agroindustrial based on Tape in Bondowoso Regency resides in the 4th quadrant. The main strategy priority is develop the processed tape products by improving the quality and value added products. **Keywords :** Cassava, SWOT Analysis, Fuzzy – AHP.

1. Introduction

Bondowoso regency is an area that produces several types of potential food plants. Potential food plants are plants that can support the economic development of Bondowoso Regency. The example of potential food plants are rice, corn, 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 processed product 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 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. Therefore, this analysis will produce the steps or strategies that need to be taken to support the development of a tape-based agroindustry in Bondowoso Regency.

2. Research Methods

2.1 Research Framework

The strategy formulation of an organization and industry always follows the dynamics internal and external strategic environment that is adjusted with the mission of the organization/industry. The presence of competitors, the dynamics of social, political, and subsequent technological developments can be analyzed by SWOT matrix. SWOT analysis is used to get the choice of strategies, and then the best strategy will be chosen according customer expectations by using the Fuzzy AHP method.

Tape and various kinds of processed Tape are signature food of Bondowoso Regency. 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 Regency. The research framework scheme is illustrated as in fig. 1.

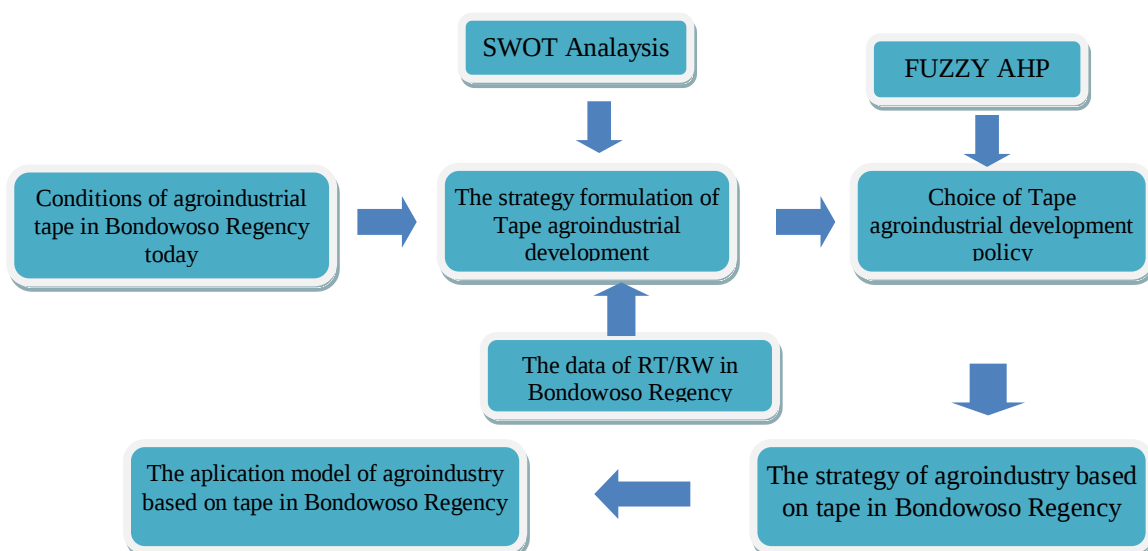


Figure 1. Research Framework

2.2 Collecting of Data

The research technique used is the survey method. Types of data collected in the form are qualitative and quantitative data, also primary and secondary data [15]. The data in this study was obtained from two data sources, there are: (a) primary data, obtained directly 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.

2.3 Reliability and Validity Test

Validity test is used to measure the level of validation or validity of an instrument [1]. The 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 R count is ≤ 0.05 ($R \leq 0.05$).

Reliability is stability, consistency, predictability or practice, and excitement or accuracy [6]. Reliability is the extent to which a measurement can be trusted. Testing of reliability of measuring instruments using the Cronbach Alpha technique. When the alpha coefficient of ≥ 0.6 can be stated that the questionnaire instrument used is reliable [9].

2.4 Research Methods and Data Analysis

The methods of processing and analyzing data are Fuzzy-Analytic Hierarchy Process and Strength, Weakness, Opportunity and Threat (SWOT). The SWOT method is used to determine the evaluation of development by analyzing external and internal factors affecting the agroindustrial tape. SWOT analysis (Strength, Weakness, Opportunity, Threat) is an analytical tool to identify the various factors that have effect in formulating the strategies [6]. The qualitative approach of SWOT analysis generates an alternative strategy. This alternative strategy can be taken by the company by looking the relationship of SWOT factors [9]. Alternative strategies have different ways to improve the performance of an organization [10].

The FAHP method is used to determine the priority of the development of a tape-based agroindustrial development strategy in Bondowoso regency. The F-AHP is a combination of AHP methods and fuzzy concept approach [11]. F-AHP covers the weaknesses that found in AHP, which is the problem of criteria have more subjective properties. The number uncertainty is represented by a scalesquence. The determination of F-AHP membership degree developed by [3], illustrated by Triangle Membership Function (Triangular Fuzzy Number/TFN). The Triangle Membership function is a combination of two lines (linear).

3. Result 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 relationship is 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.

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

NO	INTERNAL DOMINANT FACTOR	Total	Rank	Value	Value 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 label	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	Value	Value 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

3.1 IFE Matrix (Internal Factor Evaluation)

Based on the interview and validation, there are 13 internal indicators (strengths and weaknesses) of the agro-industry tape in Bondowoso regency. According to the results of research [7], superiorities (powerful aspects) of a corporation are the indications that would provide prominence out of its competitors and make the sector develop and advance. Accordingly, aspects open to development (weak aspects) are the indications that would complicate the life of corporation and make it decline. Based on the calculations contained in Table 1, can be known total internal matrix strength is 1.49 and total internal matrix weakness is 1.52, so the total internal matrix score is 3.01.

3.2 EFE Matrix (External Factor Evaluation)

Based on the interview and validation, there are 11 external indicators (opportunities and threats) of agro-industry Tape in Bondowoso regency. According to the results of research [7], opportunities are the indications that would develop the corporation, advance it from its present situation and provide favourable environmental benefit. Threats are the unfavourable environmental indications that would make the corporation decline from its present situation and even cause termination of life of it [2]. Based on the calculations on Table 2, can be known the 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 Regency

NO	EKSTERNAL DOMINANT FACTORS	Total	Rank	Value	Value 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	Total	Rank	Value	Value 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 District	12	3,00	0,11	0,32
5	Substitution product	13	3,25	0,12	0,38
Total		112		1,00	2,92

3.3 IE Matrix for Positioning

The values from IFE and EFE matrix will be inserted into the Internal-external matrix to map the agroindustrial tape position in Bondowoso Reegency. This Internal-External matrix described production potition in 9 cells. The IE matrix is based on two key dimensions, where total IFE scores on the X axis and the EFE score on the Y axis. Based on the IFE matrix and the EFE can be known the position on the X axis at 3.01 point and the Y axis position at 2.92 Point (fig. 2).

3.4 SWOT Matrix

The SWOT matrix is used to 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 known that the agroindustrial tape in Bondowoso regency 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 strategy for the region [4]. The quadrant is perfect for implementing a strategy like Table 3.

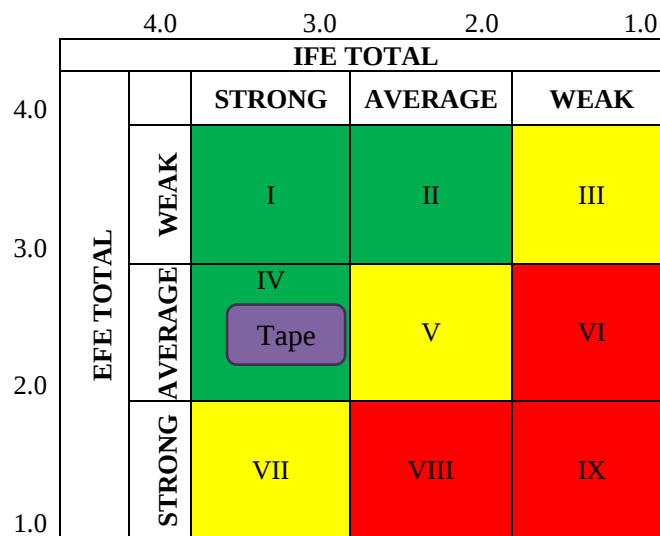


Figure 2. IE Matrix

Table 3. Matriks SWOT Analysis

		S	W
EFAS	IFAS		
	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

Table 4. Fuzzy Pair – Wise Comparasion of SWOT factors

	S	W	O	T	ΣM
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)

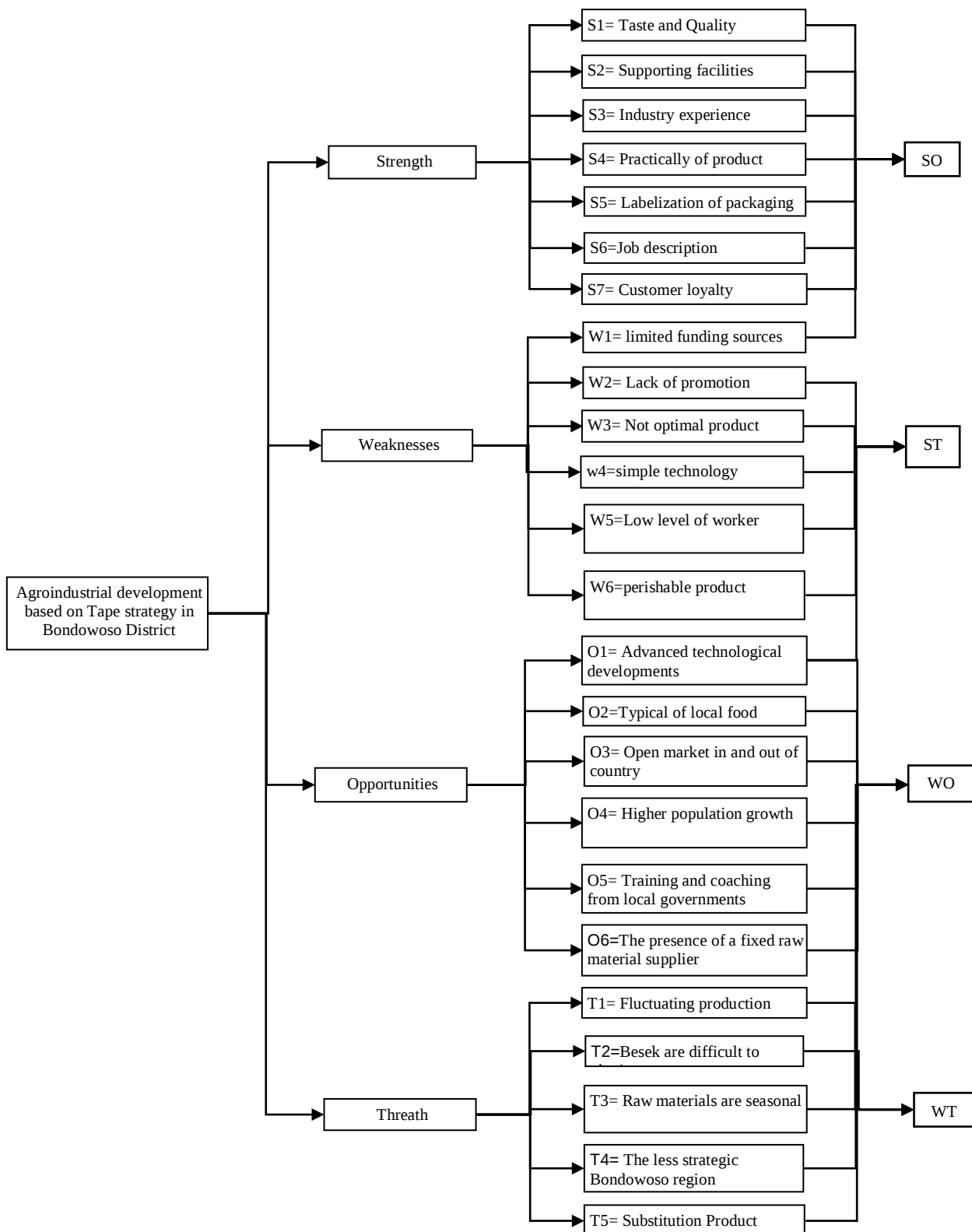


Figure 3. Hierarchical Structure of SWOT Analysis

3.5 F – AHP

The alternative selection of agroindustrial based on Tape development strategy in Bondowoso regency by using F – AHP method, consists of three levels. Each of levels, the result will be outlined in fig. 3. The problem is converted into a hierarchical structure in order to transform the sub-factors and alternative strategies into a state in which they can be measured by the FAHP. The aim of "Determining the best strategy" is placed in the first level of the structure, the SWOT factors (fig. 3) in the second level, the SWOT sub-factors in the third level and the alternative strategies in the last level of the model [8].

After the weights are obtained, the value are added up to produce a global value of each alternative, after the global value and ranking is obtained then it is searched for the average fuzzy value of AHP from each alternative and normalized value to determine the rankings of each alternative, the process of the application is shown in fig 4.

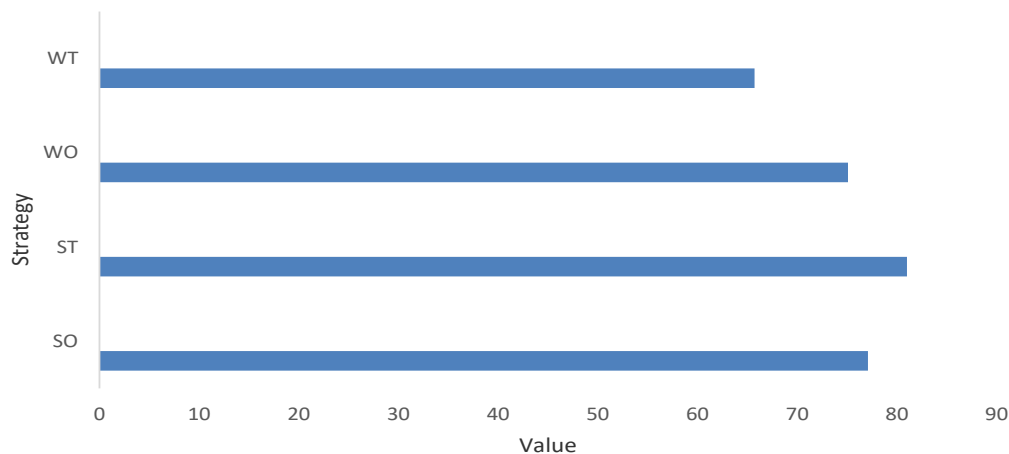


Figure 4. Ranking of Alternative Strategy options

F-AHP analysis is tools to determine the priority sectors of development and to make recommendations of agroindustrial based on Tape development strategy in Bondowoso. The results obtained from the SWOT-FAHP analysis are shown in Figure 4. Results running from F-AHP model implementation is known that the criteria that become the main consideration is the result of the SWOT analysis, the main strategy is driving strength in overcoming the threat (ST) with product development and improve product quality and value added.

4. Conclusion

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

Acknowledgements

This paper is dedicated to kemenristekdikti. This paper is part of the 2019 Higher Education grant community service.

REFERENCES

- [1] Arikunto, S. 2002. *Prosedur Penelitian Suatu Pendekatan Praktek*. Edisi Revisi V. Rineka Cipta, Jakarta
- [2] Badan Pusat Statistik Kabupaten Bondowoso. 2018. *Statistik Indonesia Tahun 2018*. Jakarta Pusat : Badan Pusat Statistik
- [3] Chang, D. Y.. 1996. *Eoruperan Journal of Operational Research* **95**: 649-655.
- [4] David, Fred R., 2013. *Strategic Management Concept & Cases, Eighth Edition.*, Prentice Hall International, Inc
- [5] Hermanuadi, D. Brilliantina, A, and Sari, E.N. 2018. Determination of Agro-Industry Area Based on Cassava Commodity in Bondowoso Regency. *IOP Conf. Series: Earth and Environmental Science* **207**: 012010
- [6] Kerlinger. N. F. 2000. *Azas-azas Penelitian Behavioral*. Gajahmada University Press, Yogyakarta
- [7] Karatop B, Kubat C, Uygun O. 2018. *Sakarya University Journal of Science* **22 (5)** : 1314-1325.
- [8] Lumaksono, Heru. 2014. Implementation of SWOT-FAHP Method To Determine The Best Strategy on Development of Traditional Shipyard in Sumenep. *Academic Research International Vol. 5(5)*
- [9] Malhotra, 1999. *Basic Marketing Research Application to Contemporary Issues*. Prentice Hall International, New York
- [10] Marimin. 2004. *Teknik dan Aplikasi Pengambilan Keputusan Kriteria Majemuk*. Jakarta (ID): Grasindo
- [11] Rahardjo, Jani dan I Nyoman Sutapa. 2002 *Jurnal Teknik Industri* **4(2)** : 82-92.
- [12] Rangkuti, F. 2006. *Analisis SWOT: Teknik membedah kasus bisnis*. Jakarta: Gramedia Pustaka Utama
- [13] Saaty, T. L. 1993. *Pengambilan Keputusan Bagi Para Pemimpin, Proses Hirarki Analitik Unit1 : Pengambilan Keputusan dalam situasi yang kompleks*. PT. Pustaka Binaman Pressindo
- [14] Sammut-Bonnici, T., & Galea, D. 2015. *SWOT Analysis*. In *Wiley Encyclopedia of Management*(pp. 1–8). Chichester, UK: John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781118785317.weom120103>
- [15] Sulyanto. 2006. *Metode Riset Bisnis*. Yogyakarta: Andi.