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Determination of Key Indicators and Scenario for Sustainability of Tobacco Production in Madura

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Abstract: ***Tobacco has been recognized as important agricultural commodity in term of excise revenue and employment. This present work aimed to 1) identify key factors that play significant role in tobacco production system in Madura, 2) establish scenario to maintain tobacco production. Data were collected from interview using questionnaires, while prospective participative analysis (PPA) was used to identify the key factors and scenario establishment. As a result, this current study successfully identified 7 key factors showing pivotal role in tobacco production sustainability system, including 1) cropping pattern, 2) land area, 3) governmental regulation, 4) land suitability, 5) productivity, 6) climate information,and 7) improvement of farmer's skill. Based on these factors, 3 scenarios were made: 1. Intensification aspect, focusing on the increase in productivity and cultivation technology, 2. Extensification aspect, focusing on regulation implementation, and 3. Trading aspect, focusing on partnership and price stabilization***

Keywords: key factor, sustainable production, tobacco, Madura

1. Introduction

Tobacco is regarded as one of the important agriculture commodities, as observed by the increase in tobacco farming area up to 216142 ha (Directorate General of Estate Crops, 2015). In addition, demand in tobacco for export has also increased, reaching up to 3.023 tons in 2013 (equivalent to US$13.782.362) (Ministry of Agriculture, 2014). An annual increase in tobacco excise also occurred at average of 14.7%(Ditjenbun, 2013, Ernst and Young, 2015). Tobacco farm also generated employment, accounting for about 1.7 million vacancies(Ernst and Young, 2015).

In Indonesia, East Java Province served as the highest contributor to domestic tobacco production, up to 56.8%, as well as having the highest tobacco farm area of 153561 ha (Ditjenbun, 2013). In this province, tobacco production was mainly supplied from Madura, with total farm area of 59968 ha spread throughout three regencies: Sampang, Pamekasan and Sumenep (Haryanto, 2013). Among these areas, Pamekasan ranked at first, covering 27000 ha of tobacco farm land (BappedaProvinsiJawaTimur, 2011; PamekasanDalamAngka, 2014). Additionally, tobacco leaf farming in Pamekasan accounted for 60-80% of farmer's revenue(Suwarso, 2008), which make it more economically feasible compared to other commodities such as paddy rice and secondary crops called as *palawija*(Ahsan, 2012; Brata, 2012).

The major problems in tobacco farming especially in Pamekasan came from many aspects, from farming methods to instability of selling price.Commonly, imbalance of supply and demand/stock is considered as the main constraint, suggesting that market mechanism seemed to be less meaningful; in contrast, traders played more significant role in price determination. This intransparency and uncertainty of tobacco trading (Haryanto, 2013) led to an increase in speculation among farmers selling their tobacco to wholesalers, even though at a lower price.

Tobacco trading faced complex problems, including social-economy and management, and utilization. To date, these major problems have not been substantially solved due to minimal role of stakeholders; thus, the current established solution is unable to be applied (Human and Davies, 2010). For this reason, pragmatic concept of the existing planning needs to be modified, with involvement of stakeholders (Godet and Roubelat, 1996;Bourgeois and Jesus, 2004; Schuman, 2010).

Based on aforementioned details, we proposed participatory prospective analysis as a tool to solve the problems, which underlined participative process and consensus among within stakeholders(Godet and Roubelat, 1996; Bourgeois and Jesus, 2004; Godet, 2010). The use of this tool allows to easily obtain key factors for solving the tobacco trading problems (Godet, 2001; Ambrosio *et al*., 2009). This present work aimed to (1) determine key variables affecting sustainability of Madura tobacco, (2) establish scenario and strategy of tobacco sustainability in Madura.

2. Methods

Data Collection

Data collection was carried out between April 2016 – October 2016 in Pamekasan, Madura, and performed with combination of quantitative and qualitative approach. Quantitative data were obtained from structured interview based on questionnaire, while quantitative data were then used for Participatory Rapid Appraisal (PRA) to stakeholders (local government for agriculture, trading, plantation, farmer group, private sector, non-governmental organization) about sustainability of Madura tobacco.

Data Analysis

Prospective Participatory Analysis (PPA) was employed, enabling to combine decision making process from expertise for arrangement of planning strategies through different approaches (Bourgeois and Jesus, 2004), resulting in position and leverage attributes for key factor in a system. The output was presented in 4 quadrants, including quadrant I as drivingvariables, quadrant II as stake variables connecting leverage variables, quadrant III as output variables, and quadrant IV as marginal variables (Figure 1).

To observe direct effects among factors within system, a matrix was used and presented in Table 1.

Table 1: Direct impacts within factors in sustainable production of tobacco

From ↓ Towards →	A	B	C	D	E	F	G	H
A								
B								
C								
D								
E								
F								
G								
H								

Source: Godet (1999)

Note: A – H= important variables in system

Scoring:

Score	Criteria
0	Not influential
1	Less influential
2	moderately influential
3	strongly influential

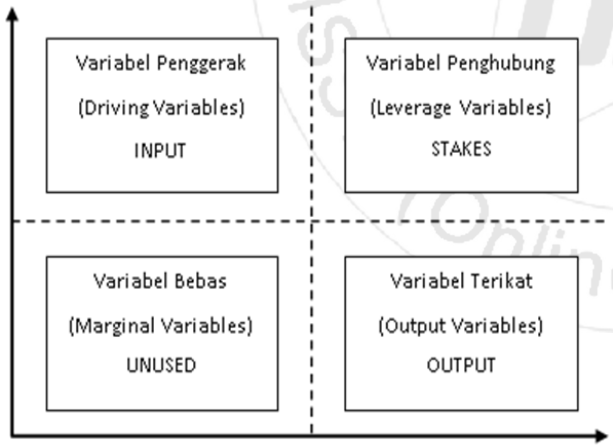

Figure 1: Level of impact and dependence between factors in system (Hardjomidjojo, 2002; Bourgeois, 2007)

3. Results and Discussion

Leverage Factor for Sustainable Tobacco Production

Leverage factor of sustainable tobacco production in Madura was reported by a previous work of Faridz *et al*., (2018), involving 44 attributes divided into ecological dimension (11 attributes), social economy (14 attributes), institutional dimension (9 attributes) and technological dimension (10 attributes), as reported in Table 2.

Table 2: Leverage attributes affecting sustainable production of tobacco in Pamekasan, Madura [a)]

	Dimension		Sensitive Attributes	RMS[b)]
A.	Ecologi	1.	Organic matter usage	1,278
		2.	Productivity	1,173
		3.	Land extensification	1,063
B.	Social-Economy	4.	Revenue source (excluding tobacco)	0,762
		5.	Marketing area	0,744
		6.	Selling price (compared to BEP)	0,715
		7.	Availability of agricultural machinery	0,698
C.	Institution	8.	Extension service	1,618
		9.	Financial service	1,478
		10.	Marketing service	1,206
D.	Technology	11.	Climate information system	3,334
		12.	Seed production	2,956
		13.	Use of recommended seed	2,586

[a)] Result of MDS leverage analysis, 2017; [b)]RMS = Root Mean Square

Prospective analysis was made to determine dominant factor, resulting 8 factors (Figure 2). The factors are equally delivered into quadrant I and II.

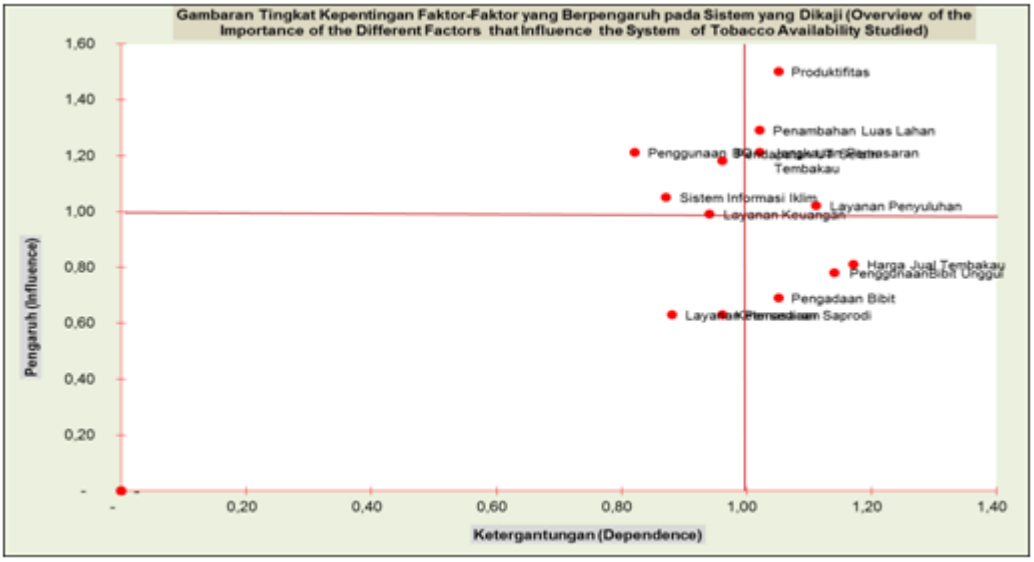

Figure 2: Difference in importance of each factor on sustainability of tobacco production in the existing condition

Determination of Key Factors

Based on interview results, a total of 22 sensitive variables are collected (Table3), yielding 11 key factors(Figure 3). Factors in quadrant I serve as driving factor, including 1) land area regulation, 2) cropping pattern, 3) land suitability, 4) role of government and NGO, 5) empowerment of tobacco farm association, and (6) business guarantee. Meanwhile, factors in quadrant II play as leverage factors, i.e. 1) enhancement of farmer's skill, 2) quality, 3) productivity, 4) climate prediction, and 5) local government's regulation.

Table 3: Sensitive attributes for sustainable tobacco production in Pamekasan based on need analysis*

	Dimension		Sensitive Attributes
A.	Ecology	1.	Land suitability
		2.	Cropping pattern
		3.	Land area management
		4.	Productivity
		5.	Quality
		6.	Optimization of natural resources
		7.	Land conversion
B.	Social/Economy	8.	Price stability
		9.	Ease to finance
		10.	Availability of agricultural machinery
		11.	Business guarantee
		12.	Storage
C.	Institution/Policy	13.	Collaboration / partnership
		14.	Role of government and NGO
		15.	Cooperation
		16.	Empowerment of tobacco farm association
		17.	Government rule
		18.	Marketing institution
D.	Technology	19.	Climate prediction
		20.	Farming technique
		21.	Seed use
		22.	Enhancement of farmer's skill

*) need analysis 2016

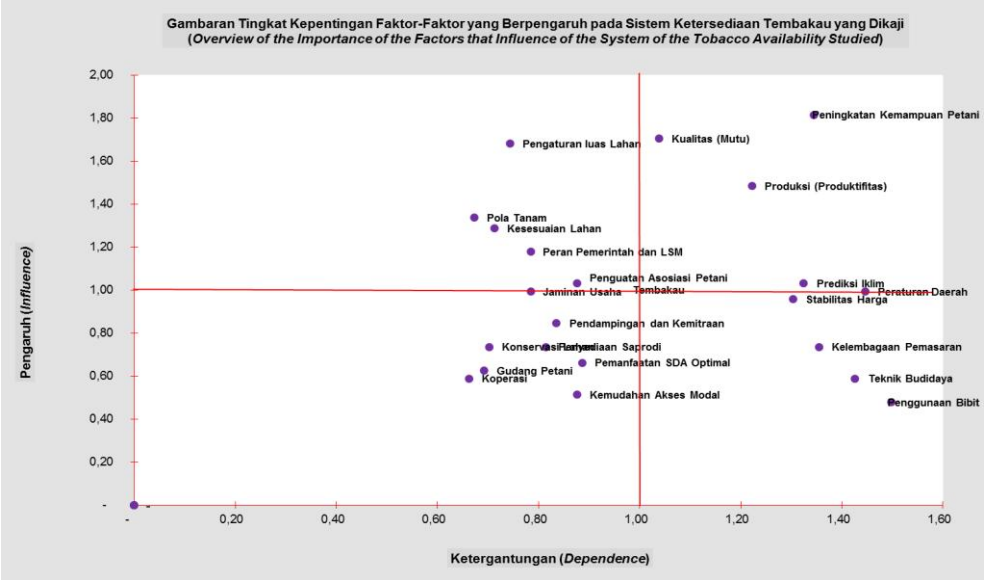

Figure 3: Importance of the studied factors affecting production of tobacco in Pamekasan

Determination of Key Factors with Combination of Importance

In this stage, the analysis was based on compilation of key factors identified previously in Figure 2 and 3. The factors are from existing conditions (8 factors) and need analysis (11 factors). Considering the similarity among these factors are obtained 13 factors as follows (Table 4):1) climate information system (climate prediction), 2) business guarantee (financial service), 3) productivity, 4) land extensification (land area management), 5) marketing service (governmentrole), and 6) extension service (enhancement of farmer's skill). Further step, i.e. prospective analysis, is needed to select which of these factors show the most importance in the tobacco sustainability system. The result is exhibited in Figure 4.

Table 4: Compilation of key factors according to existing condition and need analysis that impacts to tobacco production system in Pamekasan[*)]

No	Key factors(existing condition)[a)]	Key factors (need analysis (need)[b)]	Combined factors (intersection)[*)]
1.	Organic matter usage		Organic matter usage
2.	Climate information system	Climate prediction	Climate information
3.	Revenue source (excluding tobacco)		Revenue source (excluding tobacco)
4.	Financial service	Business guarantee	Financial service
5.	Productivity	Production/productivity	Productivity
6.	Land extensification	Land area management	Land area
7.	Marketing service	Government rule	Government rule
8.	Extension service	Enhancement of farmer's skill	Skill upgrading
9.		Cropping pattern	Cropping pattern
10.		Land suitability	Land suitability
11.		Government and NGO	Government and NGO
12.		Strengtheningrole of government	The empowerment ofAPT
13.		Quality	Quality

[*)] Intersection, [a)]First stage, [b)]Second stage

The prospective analysis resulted in 7 key factors that affect tobacco production system, and among these factors, we successfully identified 3 factors categorize as "strongly influential" and "less dependent.All key factors based on intersection area included 1) cropping pattern, 2) land area, 3) government rule, 4) land suitability, 5) productivity, 6) climate information, and 7) enhancement of farmer's skill. They are then use as the basis for establishing the scenario in tobacco production sustainability system.

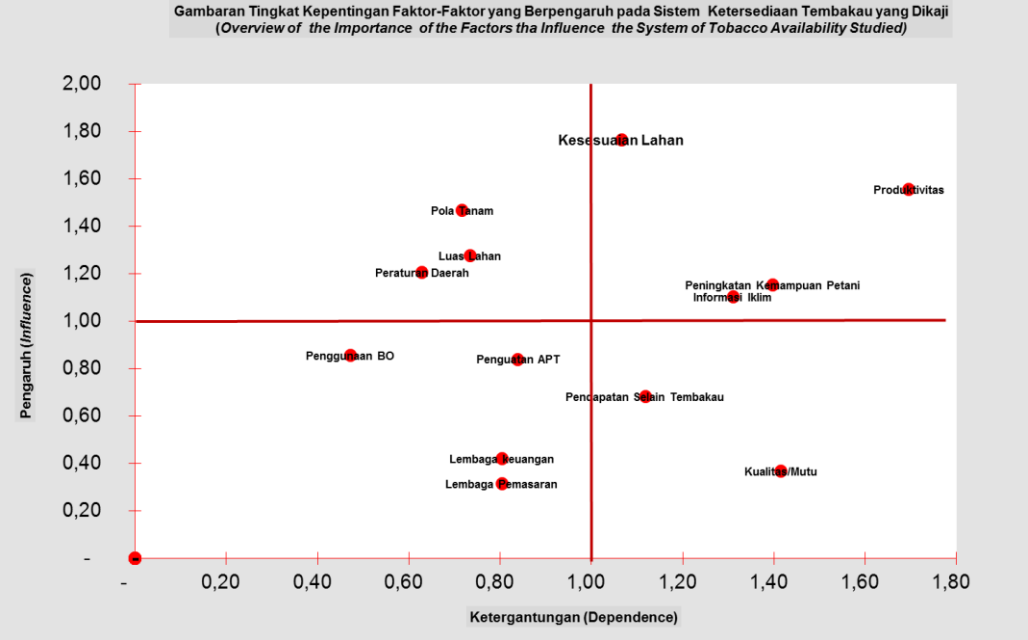

Figure 4: Importance of the combined factors affecting tobacco production sustainability system in Pamekasan

Table 5: Morphological analysis ofMutual Incompatible State and Possible Changes in Key Factors Affecting Tobacco Production Sustainability System in Pamekasan

No	Factor	Possible future states		
Supply				
		IA	IB	IC
1	Land area	Unchanged	Gradually decreased, based on farmer's condition	Decreased, while also emergence of technology improvement
		IIA	IIB	IIC

2	Productivity	Unchanged	Gradually increased, based on farmer's condition	Differently increased, with presence of noticeable supports from government
		IIIA	IIIB	IIIC
3	Land suitability	Less noticed. Increase in productive land conversion.	More portion of notice is delivered in land conversion, affecting productivity	
		IVA	IVB	IVC
4	Climate	Less noticed, resulting in high rate of harvesting failure	More noticed, providing climate information to farmers accurately	
		VA	VB	VC
5	Cropping pattern	Unchanged, no diversification	Optimal land usage for plants excluding tobacco	
Konsumsi/Kebutuhan				
		VIA	VIB	VIC
6	Regulation on cigarette demand	Unchanged	Enhanced effectivity and stronger support to farmers	Tight enforcement
		VIIA	VIIB	VIIC
7	Skills of famer and extension agent	Unchanged, as existing cultivation technology	Enhanced assistance to improve skills of farmer and extension agent	Improvement of managerial skills

Mutual Incompatible State: IC - IIA; IIC - IIIA; IIC – IVA; IVA – VB; IVB – VA; VIA – VIIC; VIB - VIIA

Scenario for Sustainable Production of Tobacco

The establishment of scenario was based on depth study and desirability (Bourgeois and Jesus 2004; Durance and Godet, 2010). In this case, there are 2 groups of factors, those affecting production of tobacco, such as land area, productivity and climate, while another factor was grouped into policy or regulation group. Based on Table 5, a state has low possibility to occur in same time (mutual incompatible state).

Table 6: Scenario analysis and intervention of key factors

	Order and level of intervention						
Existing Condition	IA	IIA	IIIA	IVA	VA	VIA	VIIA
Supply							
I. Intensification							
1. Increased productivity	IA	IIB	IIIB	IVB	VB	VIB	VIIB
2. Productivity with technological adjustment	IA	IIC	IIIB	IVB	VB	VIB	VIIC
II. Extensification	IA	IIB	IIIB	IVB	VB	VIB	VIIB
Consumption/need							
III. Trade							
1. Transaction	IA	IIC	IIIB	IVB	VB	VIC	VIIC

The scenario was established according to both supply and demand sides. Based on Table 6, here is the proposed scenario.

1) **Intensification aspect** needs to increase productivity and technology through:

a) Improvement of farmer's skill (IIB) – land area management (IIIB)– accurate and quick climate information (IVB) – plant diversification (VB) –local government regulation (VIB) – assistantship for farmers (VIIB)

b) Enhancement of partnership (IIC) – land area management (IIIB) –accurate and quick climate information (IVB) – plant diversification (VB) – plocal government regulation (VIB) – improved farmer's managerial skill (VIIC)

2) Extensification

a) Enhanced of farmer's skill (IIB) – consideration on land extension (IIIB) – accurate and quick climate information (IVB) – plant diversification (VB) –regulation forempowering farmers (VIB) – improved farmer's managerial skill (VIIB).

3) Trading Aspect:

a) Enhanced partnership (IIC) – land area management (IIIB) –accurate and quick climate information (IVB) – plant diversification (VB) – strong law enforcement (VIC) – improved farmer's managerial skill (VIIC).

4. Conclusions

This present work successfully identified 7 key factors showing pivotal role in tobacco production sustainability system, including 1) cropping pattern, 2) land area, 3) governmental regulation, 4) land suitability, 5) productivity, 6) climate information,and 7) improvement of farmer's skill.Based on these factors, 3 scenarios were made: 1. Intensification aspect, focusing on the increase in productivity and cultivation technology, 2. Extensification aspect, focusing on regulation implementation, and 3. Trading aspect, focusing on partnership and price stabilization.

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