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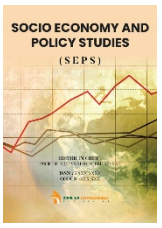

RESEARCH ARTICLE

SCIENCE-BASED TERRITORY DEVELOPMENT STRATEGY IN ORDER TO ACCELERATION OF AGRICULTURAL TECHNOLOGY INNOVATION AND DISSEMINATION

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ABSTRACT

In the fact field varies inversely household that the conditions of the majority of farmers are poor families. One of the solution of this is in development of an area based science in order to accelerate the event innovation. The purpose of this paper is to identify the internal and external the tsp bptp sumbar and development strategy the tsp bptp sumbar based as the area of agricultural science in order to accelerate the event innovation. The study is done in the TSP west sumatra on the moon mei-juli in 2019. The research was done with data collection method that is survey through observation field, interviews and the literature study. The primary data was obtained directly by observation of the field and interview deeper namely with the management, researchers, visitors, associated regional governmentz. Secondary data with the study literature. The method of analysis of the data used motode with training. Based on the research done on the strategy based area development a science (the TSP with specific bptp sumbar in order to accelerate the dissemination of technology innovations agricultural sector is strategy rapid growth strateg). A strategy could be implemented is (1) made the tsp as a center for research and innovation; (2) made the TSP as the acceleration of the transfer of information dissemination/education, farmers through technology innovation training and apprenticeship to the. Agribusiness (3) made the tsp as a means to commercialize the technology innovation. agriculture (4) speed escalation/acceleration of technological innovations agriculture through the development of a replica of the TSP.

KEYWORDS

development, dissemination, innovation agriculture, technology, strategy.

1. INTRODUCTION

Agricultural Research and Development Agency of the Ministry of Agriculture has the duties and functions as a center for research and development of agricultural technology innovation. In accordance with, MOA No. 11 of 2019 and Permentan No.19 / Permentan / OT.020 / 5/2017. This research and development institute is one of the elements producing science and technology in the form of an invention or invention. If the invention can encourage the birth of new products, improve the quality of existing products, or process efficiency, it is called innovation. There have been many innovations produced by R & D institutions such as varieties, technology, recommendations, scientific papers (KTI), etc. This technological innovation has been produced with the aim of bringing improvements in the productivity of agricultural products and opening up innovation-based on small and medium enterprises. All technological innovations that are produced must be disseminated and delivered in their entirety according to the needs so that they are implemented by the community (Garina, 2015). The development of this innovation will have a positive impact on people's economic growth. But the reality in the field is that farmers' income levels are still low according to data from the Central Statistics Agency (BPS) which released the results of the 2018 Agricultural Census (ST) with a total of 26.14 million agricultural households. Most of the workers in the agricultural sector live below the poverty line. For that, we need an area that functions to assist farmers in increasing the productivity of their agricultural products through research results so that they can improve community welfare.

Therefore an area is needed that facilitates the development of agricultural research and assessment results based on agricultural technology innovation that can be accessed by the public. Agriculture assessment and development of science and technology based areas which will later provide opportunities for all parties such as the government (research agencies), researchers, universities and the private sector to collaborate to build science-based facilities and infrastructure and produce effective and efficient technological. Effective and efficient innovation which later can be implemented by the wider community.

In order to accelerate the birth of innovation and acceleration of information through the dissemination of agricultural technology innovation, a vehicle or media is needed, one of which is the Agro Science Park (ASP) or Agricultural Technology Science Park (TSP). The concept put forward, ASP as a medium that will provide space for applications, an integrated agricultural technology pilot for researchers. Besides that, it is also a medium for disseminating agricultural technology innovations through training and transfer of integrated agricultural technology to the community. The purpose of this research is to identify internal and external factors in the development of TSP BPTP West Sumatra and to

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analyze the strategy for developing TSP BPTP West Sumatra as a basement area in order to accelerate the dissemination of agricultural technology innovation.

2. METHODOLOGY

2.1 Place and Date of Research

This research was conducted at the West Sumatra Agricultural Science Park in May-July 2019.

2.2 Research Methods

The research was conducted using data collection methods, namely surveys through field observations, interviews and literature study. In this study using primary data and secondary data. Primary data were obtained directly by field observations and in-depth interviews, namely with managers (3 people), researchers (3 people), visitors (10 people), and related local governments (2 people). Secondary data with literature study were obtained from agencies related to this research.

2.3 Data Analysis Method

Variable measurement concept:

- Identification of indicators related to the strength possessed by the TSP BPTP West Sumatra.
- Identification of indicators related to weakness which is owned by TSP BPTP West Sumatra.
- Identification of indicators related to opportunities owned by TSP BPTP West Sumatra.
- Identification of indicators related to Threats owned by TSP BPTP West Sumatra.

The formulation of a science-based area development strategy (TSP) in West Sumatra with a SWOT analysis using brainstorming techniques with researchers, related stakeholders and other agribusiness actors. SWOT is an analysis used to determine the internal and external effects of science-based areas (TSP) on strengths, weaknesses, opportunities and threats as well as the formulation of development strategies based on the potential of the research area (Rangkuti, 2015).

3. RESULT AND DISCUSSIONS

3.1 Geographical Condition of West Sumatra BPTP Agricultural Sciences Park (TSP)

TSP BPTP West Sumatra is located on a plateau 800-1050 meters above sea level, with a wet and cold climate with an air temperature of 18-24 ° C, a humidity of 65-95% and a rainfall of 2,088.2 mm / year (± 200 mm / month). The land area reaches 126 hectares which is dominated by dry land with sloping and wavy tofography. Judging from the geographical aspect, TSP BPTP West Sumatra is very suitable for the development of commodity crops, vegetables, fruits, plantation crops, ornamental plants, and toga plants as well as forage forage (HMT). TSP BPTP West Sumatra, is a means of support as a show window in disseminating agricultural technology innovations.

Figure 1: Layout of of West Sumatra BPTP Agricultural Sciences Park (TSP) Area Duties and Functions of the West Sumatra BPTP Agricultural Science Park

3.1.1 TSP BPTP West Sumatra as a Means of Research and Development of Agricultural Technology Innovation

TSP BPTP West Sumatra has the task and function as a means of research and study of agricultural technology. This TSP BPTP West Sumatra accommodates researchers to conduct studies related to the efficiency of a process or produce recommended technology packages that can increase agricultural productivity so that it can be easily implemented by the community with the aim of improving community welfare.

This is consistent with the development of the regional development concept put forward by the National Planning Agency (2006), Rosenfeld (1997), Michoel Poter (1993) using a cluster approach. Kuncoro and Sumarno (2003) and Abdullah, et, al (2002), one of the strategies commonly used in regional development uses a cluster approach that focuses on dependence and cooperation between actors (such as: government, universities, private sector, community, business associations / community) involved in production activities to services, in the cluster there are efforts to innovate and develop industry in a broad sense (sepetri: agricultural industry or crafts). Success factors in regional development with a cluster approach, namely: 1. Research capacity (innovation), 2 specializations, 3. Human resource development 4. Cooperation networks and social capital 5. Entrepreneurship.

This research capacity building factor is related to the research and studies conducted so that it can become a recommendation for users of agricultural technology innovation. Another factor that also determines is specialization, the commodities developed vary but there are main commodities in the Agricultural Science Park that characterize an area. In the Agricultural Science Park, there are two characteristic commodities, namely lettuce and food crops in the form of corn. Another factor that is no less important in the development of an agricultural area is a network of cooperation (multi-parties) and social capital that must be built. This is one of the keys to the sustainability of an agricultural area. Collaboration networks that are formed both internally and externally by agencies such as the government, universities, the private sector, community communities, NGOs, etc.

Before social capital entered the concept of development planning, the perspective of development planning in the late 19th century focused on (Friedman 1987 in Taylor, 1998 and Munir, 2002):

1. Only focused on the development aspects of the physical environment (morphological conception of space).

2. The initial concept of development planning in the context of orthogonal design.

3. In developing countries, the perspective of physical development and economic development is separate. At this time, the focus was more on structuring and providing physical infrastructure, while the socio-economic aspect did not get much attention.

There have been developments in development planning theory, resulting in a shift in perspectives and views in the implementation of development planning theory (Taylor, 1998), (Brooks, 2002), (Friedman, 2003), (Healey, 1997) (Sandercock, 1998):

1. There was a shift in the concept from morphological conception of space to sociological conception of space.

2. It began to be realized that development could not be carried out only from the physical design aspect, but collaborated with the aspects of social life and economic activities.

3. A shift from the modernization paradigm with instrumental rationale to the postmodern paradigm with communicative rationality (Habemas' theory of communicative action).

4. The shift in paradigm from modernization to post modern affects the implementation of development planning with a heroic planning model approach, the changes include (a) a shift from instrumental rationality to communicative rationality, (b) development planning is not only from an integrative perspective but has led to negotiations, c) development planning is not only about the engineering mindset but a lot of knowledge related to it such as action research, hermeneuistics, etc. (d) development planning is no longer directed by the state, but develops the implementation of community-based planning, (e) planning does not only operate for the benefit of public but development planning for multiple publics.

The concept of social capital was initially divided into two, namely

financial capital and physical capital. Light (2004) states that the concept of social capital can be developed more broadly, if it is interpreted as something that facilitates action. Bordieu (1986) in Light (2004) has 3 additional aspects of capital, namely cultural capital, human capital and social capital. Human capital lies in individual skills and knowledge, cultural capital is related to cultural knowledge and provides benefits to the socio-cultural aspects, while social capital is a trust embedded in social networks.

Figure 2: Maize Crop Research

Figure 3: Vegetable Research with Hydroponic Method

3.1.2 TSP BPTP West Sumatra as a means of disseminating agricultural technology innovation.

Agricultural Science Park as a center for accelerating the dissemination / transfer of information on agricultural technology innovation through education, training and internships for agribusiness actors. The approach taken is an effort to provide information about technology packages that can be recommended to the wider community. Below are the number of training or educational visits carried out at TSP BPTP West Sumatra:

Table 1: Number of TSP BPTP West Sumatra Visitors, 2019

Numb	Month	Agency/Institute	Amount (Person)
1.	May	KWT Edelwis, Payakumbuh (Comparative Study)	45
		TK Pembina Kota Solok (Plant learning)	80
		Farmers of prov. Jambi (Educational Visits)	45
		SMP 4 Tanah Datar (Educational Visits)	50
		BPP Kec. 5 Kaum Tanah datar	30
		SMA X Tanah Datar (Educaional Vistis)	75
2.	June	General public (visit and shopping)	75
		Mahasiswa Unand (educational visits)	64
		Poktan Bawang Merah, Kota Payakumbuh (belajar)	4
		General public (educational visits)	80
		Dinas Tanaman Pangan Indragiri Hilir, Riau (Comparative study)	52
		SMA 1 Lubuk Basung (Hidroponik learning)	67
		Poktan Pasaman Barat (an intership in chili cultivation and onion intercropping)	60
		SMAN 1 Gunung Talang (hidroponik learning)	90

Source: Visit Data on TSP BPTP West Sumatera, 2019

Everyday TSP BPTP West Sumatra has visitors who come to do training or internships. In disseminating / transferring information a very important role here is the agricultural extension. This is in accordance with (Sumarjo, 2012), that in the future the challenge for agricultural extension in disseminating agricultural technology innovation is how to always be able to develop participatory, appropriate and sustainable agricultural innovations. Besides the empowerment that is carried out for farmers, extension workers must also be empowered in order to increase the capacity of extension workers. This is in line with (Azhari et al., 2013), providing training needs to be carried out for extension workers aimed at strengthening the capacity of agricultural extension workers, because one of the factors of successful dissemination is that extension workers are able to become consultants and facilitators for farmers, because extension workers are the main source of farmers to obtain information and explanation (Andriaty and Setyorini, 2012). This is reinforced by the results of research by (Margono and Sugimoto, 2011) regarding the barriers to agricultural extension in transferring / disseminating agricultural technology innovations to farmers, showing that the government needs to find solutions to extension agents' constraints, such as smooth access to extension agents to obtain technology packages according to field conditions.

Inequality problems in current agricultural development, such as in some areas having stable food conditions and in other regions having unstable food conditions, this is inseparable from the various technological innovations that have resulted from cultivation to post-harvest handling that do not reach users / Public. The resulting technological innovation is expected to be disseminated and adopted on an ongoing basis, therefore it requires integration and interaction between research institutions, extension services, and technology recipients in producing and disseminating technological innovations.

Figure 4: Dissemination of Agricultural Technology Innovations

The attachment of these three components is an innovation system, in the context of agriculture it is called an agricultural innovation system. This is in line with the opinion of several experts regarding the concept of agricultural innovation systems such as (Taufik, 2005; Freeman, 1987; Lund, 1992; Nelson, 1993; Metcalfe; 1995) concluded that the concept of innovation systems is a set of multi-actors that are interrelated and cooperate with each other in producing, disseminating, using new knowledge that is economically useful. (Arnold and Bell, 2001; World Bank, 2012); Mardianto, 2013), have formulated a shift in the agricultural innovation system, namely from a linear innovation system based on national agricultural research (National Agricultural Research System-NARS), to knowledge-based innovation system.

Agriculture and information systems (Agricultural Knowledge and Information System-AKIS), and most recently the modern agricultural innovation system (Agricultural Innovation System-AIS), with the main characteristic of a modern agricultural innovation system, namely the increasing number of business actors as technology users who interact with each other. dynamic and flexible in producing and disseminating agricultural technology innovations.

3.2 Analysis of Development Strategy for Agricultural Science Park BPTP West Sumatra

To analyze the development of TSP BPTP West Sumatra as a science-based agricultural area development can use a SWOT analysis tool. There are several factors identified consisting of internal and external factors based on the TSP condition of BPTP West Sumatra.

3.3 Internal Factor Analysis (IFAS)

The internal environmental analysis on TSP BPTP West Sumatra that has been carried out is related to internal strategic factors consisting of strengths and weaknesses factors in the development of science-based agricultural areas, which are presented in Table 2.

Table 2: Internal Strategic Factors for Beef Cattle Business in The Research Location.

	Strategy Factors	Value	Rating	Score
	Strenght (S)			
1	Has extension researchers who are competent in the field of agriculture	0.10	4.8	0.48
2	Availability of agricultural training and education facilities	0.12	4.8	0.57
3	As a means of research and study of agricultural innovation	0.09	4.7	0.42
4	Build relationships with stakeholders related to CSR development	0.11	4.2	0.46
5	In accordance with the needs of farmers and society	0.10	4.1	0.41
	AMOUNT	0.52		2.34
	Weakness (W)			
1	Management resources are limited	0.10	3.5	0.35
2	Lack of awarness to protect the area	0.10	3.3	0.33
3	Inadequate incubation facilities	0.07	2.9	0.20
4	Lack of facilities and infrastructure	0.10	2.5	0.25
5	Sustainability of activities	0.11	2.4	0.26
	AMOUNT	0.48		1.39
	Total of SW	1.00		3.76
	Score of SW	2.34 – 1.39 = 0.95		

Source: Primary data processed IFAS, 2019

3.4 External Factor Analysis (EFAS)

External environmental analysis on TSP BPTP West Sumatra that has been carried out related to external strategic factors consisting of opportunities and threat factors in the development of science-based agricultural areas, are presented in Table 3.

Table 3: External Strategic Factors for Beef Cattle Business in The Research Location

	Externa Strategic Factors	Value	Rating	Score
	Opportunities (O)			
1	The number of visitors who want to visit the TSP BPTP West Sumatra	0.12	4.8	0.57
2	Absorb labor in the area around TSP BPTP West Sumatra which can reduce unemployment.	0.11	4.5	0.49
3	The growth of start-up businesses based on agricultural innovation	0.13	4.5	0.58
4	Potential to make a replica of the Agricultural Science Park.	0.14	3.4	0.47
5	Commercialization of agricultural technology innovations	0.12	3.8	0.45
	Amount	0.62		2.56
	Threats (T)			
1	Unclear market regulation	0.13	2.1	0.27
2	Research crop pests	0.13	2.7	0.35
3	Extreme climate	0.12	2.4	0.28
	Amount	0.38		0.9
	Total of OT	1.00		3.46
	Score of OT	2.56 – 3.46 = 1.66		

Source: Primary data processed, 2019

In the table above, it can be seen that the total score of external factors is 3.46, this means that the TSP BPTP West Sumatra has a strong position in developing as a science-based agricultural area in order to accelerate agricultural technology innovation. The main opportunity in the future is the growth of startups with efforts to disseminate / transfer information and to incubate through targeted and sustainable incubators.

3.5 Mapping the Development Position of TSP BPTP West Sumatra

Figure 5: Matrix of Development Position TSP BPTP Sumbar

To determine the position of the current condition and the development of TSP BPTP West Sumatra can be done by combining internal and external factors. Seen in the image above.

Figure 5 shows that the position of the West Sumatra BPTP TSP development at the coordinate point (3.76, 3.46) is located in quadrant I. This shows that the TSP BPTP West Sumatra has great strength and opportunity in the future development of TSP. The development strategy is suitable and appropiate with the position of TSP as a science-based area in order to accelerate the dissemination of agricultural technology innovation is a progressive strategy that supports regional growth, and is on a fast growth strategy (*rapid growth*).

3.6 Agricultural Science Park Development Strategy BPTP West Sumatra

Internal and external factors determine the development of TSP BPTP West Sumatra in the study area. The results of the total score obtained, the appropriate strategy in the development of TSP BPTP West Sumatra is in quadrant I. This position indicates that the TSP BPTP West Sumatra is strong and likely to be developed, the recommended strategy given is progressive, meaning that beef cattle business has good development prospects supported by strength and great opportunities for future development.

INTERNAL / EXTERNAL	STRENGTHS (S)	WEAKNES (W)
	1. Having extension researchers who are competent in the field of agriculture. 2. Availability of agricultural training and education facilities. 3. As a means of research and study of agricultural innovation. 4. Build relationships with stakeholders related to CSR development. 5. In accordance with the needs of farmers and society.	1. Management resources are limited. 2. Lack of awareness to protect the area. 3. Inadequate incubation facilities. 4. Lack of facilities and infrastructure. 5. Sustainability of activities.
OPPORTUNITIES (O) 1. The number of visitors who want to visit the TSP BPTP Sumatera Barat. 7. Absorb labor in the area around the TSP BPTP West Sumatra which can reduce unemployment. 2. The growth of start-ups businesses based on agricultural innovation. 3. Potential to make a replica of the Agricultural Science Park. 4. Commercialization of agricultural technology innovations	**STRATEGY (SO)** 1. Making TSP a center for research and study of agricultural technology innovation. 2. Making TSP a center for accelerating the dissemination / transfer of information on agricultural technology innovation through education, training and internships for agribusiness actors. 3. Making TSP a means of accelerating the commercialization of agricultural technology innovations. 4. Accelerate the escalation / acceleration of agricultural technology innovation through the construction of TSP replicas.	**STRATEGY (WO)** 1. Increasing management resources through coaching. 2. Commercialization of agricultural products is enhanced through Agrimart (minimarket). 3. Preparation of incubation facilities for business incubators.
TREATHS (T) 1. Unclear market regulations. 2. Research plant disease pests. 3. Extreme climate.	**STRATEGY (ST)** 1. Clear establishment of market regulations. 2. Anticipating the possibility of pest attacks and extreme climates by maintaining cropping patterns.	**STRATEGY (WT)** 1. Increase the awareness of visitors to protect each other in the research area. 2. Creating timed agendas to maintain the sustainability of activities.

Figure 6: SWOT Matrix of TSP BPTP Sumbar, data processed, 2019.

From the description of the matrix above, it can be seen that the development of TSP BPTP West Sumatra as a science-based area is quite strong and has a great opportunity to become a science and technology-based area that can disseminate / transfer information about technology. agriculture, so as to improve the welfare of the community. The strategic recommendations that are formed are progressive, meaning that the science-based agricultural area is in prime condition so that it is hoped that its scope can be expanded, expanded and its progress maximized.

4. Conclusion

Based on the results of research on a science-based regional development strategy (TSP BPTP West Sumatra) in order to accelerate the dissemination of agricultural technology innovation is the Rapid Growth Strategy. Strategies that can be implemented are (1) Making TSP a center for research and study of agricultural technology innovations. (2) Making TSP a center for accelerating the dissemination / transfer of information on agricultural technology innovation through education, training and internships for agribusiness actors. (3) Making TSP a means of accelerating the commercialization of agricultural technology innovations. (4) Accelerate the escalation / acceleration of agricultural technology innovation through the construction of TSP replicas.

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