Article Type: Research Paper

Does Technopark Play a Role in Local Economic Development? Case Study in Samosir Regency

Agisa Kuntias*, Tanti Novianti, and Anna Fariyanti

AFFILIATION:
Department of Agribusiness, Faculty of Economics and Management, Bogor Agricultural University, West Java, Indonesia

*CORRESPONDENCE:
agisakuntias1@gmail.com

Abstract: Local economic development is one of the development policies that is considered appropriate and strategic in the context of regional development in Indonesia by optimally utilizing local resources. In line with this concept, the Government of Samosir Regency established a technopark as a centre for innovation based on inland fishery resources to encourage local economic activities for the community. The purpose of this study is to examine the strategy of the local government of Samosir Regency in developing the local economy through technopark based on inland fishery resources. The analytical tool used by the Analytical Network Process (ANP) includes analysis of aspects of factors, problems, solutions, and alternative strategies. Based on the results of the ANP analysis, the collaboration factor is the most influencing factor in strategy development. Meanwhile, in the problem aspect, the problem of limited infrastructure, low public interest and weak commitment, are the main problems that need to be resolved, so that the solution aspect becomes a priority is building trust between stakeholders, allocation of financing for infrastructure and socialization of coaching programs to the community. The formulation of the main strategy for local economic development through the development of technoparks based on the results of the ANP analysis is to build multi-stakeholder synergy to support local economic development in Samosir Regency.
Keywords: Local Economic Development; Technopark; ANP
JEL Classification: O10; Q55

Introduction

In line with the implementation of regional autonomy and fiscal decentralization, the role of local governments in pursuing regional competitiveness has become crucial and strategic. An area is very important to have competitiveness for several reasons, including; (1) for investment, attracting foreign private capital and public capital; (2) for the workforce, encouraging a skilled and creative workforce, creating a conducive environment and providing for the domestic labour market; (3) for technology, attracting innovation activities and knowledge transfer (Awan et al., 2021; Sabirov, 2021; Song et al., 2021). Therefore, regional competitiveness is the key to increasing the national economic growth rate, thus requiring special attention to create a good investment climate nationally (Kiseľáková et al., 2019; Wilson, 2019).

In addition, efforts to increase regional competitiveness can be carried out through regional economic development by utilizing the potential possessed by each region (Rochwulaningsih et al., 2019). Economic development in each region can be interpreted as the process of local governments and their communities utilizing some of the existing local resources and is expected to increase development (Magdalena & Suhatman, 2020). This process elevates the significance of the local economy's growth because it can be used to create new opportunities or jobs and foster growth (Ferronato et al., 2019; Khan et al., 2020; Schroeder et al., 2018).

In the context of regional development in Indonesia and in anticipation of the free trade period, one of the pertinent and strategic development policies is local economic development. Local economic development policies are essentially regional development policies based on the development of sectors that are the highest priority for economic activities in local communities. (Suriyankietkaew & Nimsai, 2021).

The application of local economic development policies that emphasize optimizing local resources needs to be implemented in Samosir Regency, especially regarding fishery resources. Samosir Regency is one of the 8 (eight) regencies surrounding Lake Toba with an area of lake waters of 624.80 km2 of the total area of Lake Toba, which is 110,260 km2, so it has great potential in the development of Lake Toba aquaculture. Lake Toba is the largest lake in Indonesia and holds enormous fishery resource potential. One of Lake Toba's most developed economic activities is the cultivation of tilapia. The economic turnover of aquaculture, especially tilapia, can reach up to Rp. 5 trillion per year. The tilapia export from Lake Toba also contributes 21% to the Gross Regional Domestic Product in the Lake Toba region. It is considered much larger than the contribution of other sectors. Based on data from the Central Bureau of Statistics (BPS) for 2021, the export volume of tilapia in 2020 reached 12.29 thousand tons with an export value of 1.5 trillion Rupiah. North Sumatra is the most significant contributor to tilapia exports, which is around 95%. (Prambadi, 2021).

Figure 1 Picture of Samosir Area

Based on Figure 1. Samosir Regency is rich in potential natural resources, especially water resources, where most of the area is water. The de facto area of Samosir Regency includes Samosir Island, which Lake Toba surrounds, plus part of the mainland of Sumatra Island. The area is 2,069.05 km2, with a land area of around 1,444.25 km2 (various topography and land contours, namely flat, sloping, sloping, and steep). The fishery potential of Samosir Regency is huge, but its management is not optimal. For example, the Fish Seed Center (BBI), which the Samosir Regency Government established to produce superior fish seeds for the cultivating community, can only supply 15 percent of the total fish seed needs. In addition, Samosir requires 100,000 fish seeds per day for the needs of fish farmers in Samosir, so the needs for fish seeds must be supplied from other areas such as Pematang Siantar and Simalungun, and this results in high transportation costs (Sijabat, 2018).

Based on data from the BPS of Samosir Regency, the role of the Agriculture, Fisheries, Livestock, and Forestry Plantations sector in forming Samosir Regency's GRDP reaches more than 50%. This finding shows that these sectors are the majority source of income that has so far supported the economy of Samosir Regency (LIPI, 2017). Fisheries businesses in Samosir Regency are generally still managed as household businesses, both aquaculture and fishing activities. According to the Samosir Regency BPS, until 2013, aquaculture households in Samosir Regency continued to grow to 362 households consisting of 231 fish farming households in ponds and 131 floating net cages (KJA) fish farming households.

Recognizing the problem of the lack of supply of fish seed needs, the Samosir Regency Government sees the need for a revitalization policy of BBI to maximize BBI production and achieve the production target of fish seed needs. The revitalization of BBI Samosir requires technological assistance and experts to optimize fish seed production. Based on this, the Samosir Regency Government initiated a collaboration with the Indonesian Institute of Sciences (LIPI) to revitalize BBI Samosir. Through the LIPI Limnology Research Center, a study was conducted on BBI Samosir, and based on the study results; it was proposed to build a Technopark Samosir as a centre for research and technology areas in the waters of Lake Toba. In addition, Samosir Technopark functions to build an integrated fisheries system and form innovation-based industrial clusters in Samosir Regency. Technopark Samosir has been operating since 2015, with the initial focus of activities on developing fisheries and managing aquatic resources in the Lake Toba area.

Samosir is one of the best practises technoparks because it has produced fish hatchery technology with significant results; however, little is known about Samosir technopark. Considering that forty percent of Samosir's territory is water, the potential to develop its fisheries is enormous. In addition to the exceptional future tourism potential of Samosir, the presence of a technopark can promote the expansion of the tourism industry in Samosir. (LIPI, 2017)

Previous research that has been carried out includes the study of on the Analysis of Bureaucratic Innovation in the Technical Implementation Unit (UPT) of Cimahi Techno Park. The results of this study indicate that the Technopark program in Cimahi City

significantly impacts efforts to develop the local economy by forming a telematics industrial area and giving birth to new entrepreneurs based on innovation and technology (Rokhmat & Paskarina, 2021). Other research related to technoparks in the region, including those conducted by (Sudiyatno & Wulandari, 2020), examined education and training programs at Technopark Solo, which can improve the knowledge and skills of participants consisting of MSME groups and community communities. Meanwhile, technoparks in various countries have also been proven to encourage a region's economic growth. Seo (2013) shows that the growth of venture companies in Daedeok Innopolis (Korea Technopark) significantly impacts the regional economy, and the economic growth rate is very high.

Polnaya and Darwanto (2015) conducted subsequent research regarding Local Economic Development to Increase Competitiveness in the Creative Economy SMEs of Batik Bakaran in Pati, Central Java. This study concludes that based on the Analytical Network Process, the Local Economic Development Strategy to increase Competitiveness in Batik Creative SMEs, it is necessary to improve the technology aspect and the quality of human resources as the main priority for improvement.A Technopark institution requires multi-stakeholder collaboration, including local Government, academics, the business sector, community, and media, in implementing the Technopark program (Noori et al., 2020) Every stakeholder member of the Technopark institution needs to play a role and actively participate in optimally creating industrial clusters that can be a driver of competitiveness for the local economy of Samosir. Local economic development is an area/location-based economic development process carried out through collaboration between the Government, the community, and the private sector ("market") to optimise the use of local resources in order to improve the welfare of the community as a whole (Leigh & Blakely, 2017) The definition of local economic development in the new paradigm refers to the synergistic cooperation between the Government, the community, and the "Market", which is the key to the success of local economic development. Some research results also recommend that efforts increase integration, collaboration, coordination, or participation as part of the synergistic dimension or factor to support the success of local economic development in several countries (Tello, 2011). The novelty of this research is to study the Development of Technopark based on water and fisheries resources, where one of the potential businesses is in the waters sector; Samosir is one of the areas that is quite good in terms of data based on waters and fisheries income.

This research purpose is expected to provide recommendations for policymakers to improve the competitiveness of the Samosir Regency and to study about the effectiveness of technopark making in the Samosir Area. The objectives of this research include: 1) Identify Technopark Development's impact on local economic development in Samosir Regency; 2) analyze the form and role of the Multi-stakeholder collaboration in the Samosir Technopark institution; and 3) formulate a strategy for developing the local economy of Samosir through the development of marine and fishery resource-based technoparks.

Research Method

Data collection and processing time were carried out for three months. The types of research data are secondary data and primary data. Secondary data were obtained from documentary studies in the form of reports on the development of Technopark Samosir, development planning documents originating from LIPI as the academic side, and also the Samosir Regency Government (LIPI: LIPI Limnology Research Center, Samosir Regency Government: Samosir Regency Bappeda, Management Organization Samosir Technopark, BPS Samosir). Primary data were obtained from interviews and filling out questionnaires through related research informants (Head of Research Center, Researcher involved, Head of Bappeda and Manager of Samosir Technopark, Head of Farmer Community and Start-up/MSME Actors. The data in this study amounted to 5 people, this is because the ANP method only requires a minimum of 2 respondents and is considered an expert in their field, and already represents the issues raised (Saaty, 2008).

The sample in this study will be taken by purposive sampling. The sample members were selected based on representatives from the Samosir Government, LIPI researchers, MSME/Start-up actors, community representatives, and the media. The main objective of a purposive sample is to produce a sample that can be logically assumed to be representative of the population (Frey, 2022).

This study's data analysis method consists of three stages, namely descriptive analysis, in order to determine the impact of technopark development on local economic development in Samosir Regency. In addition, the analysis method will be used to analyse the multi-stakeholder collaboration in Technopark Samosir, and the stakeholder analysis method will be implemented by conducting in-depth interviews with the five involved stakeholders. Finally, after getting an overview from the descriptive analysis, to formulate a strategy for local economic development through the development of technoparks, the ANP (Analytical Network Process) method will be used, by analyzing the assessment criteria to obtain a set of measurement standards, to then be used as a tool in comparing various alternatives. ANP uses the rater agreement value. Rater Agreement is a measure that shows the level of conformity (agreement) of the respondents (R1-Rn) to a problem in one cluster (Magfiroh et al., 2020). There are some essential differences between AHP and ANP, as well as explaining the advantages of using the ANP method compared to AHP. First, the scope of AHP analysis is more limited, while the coverage of ANP is more comprehensive than AHP. This explanation is because the model framework structure is in the form of a hierarchy in the AHP, while the ANP is in the form of a more varied network to reflect problems like the actual situation better. Second, in the hierarchical structure of AHP, there are only dependencies between lower and higher levels, while in ANP, the network structure also has feedback. Third, with this feedback, alternatives can be dependent on criteria, such as on a hierarchy, but can also be dependent on each other. A sensitivity analysis will also be carried out to see the priority ranking of the types of policies that have been analyzed (Janeš & Begičević Ređep, 2018).

Result and Discussion

Benefits of Technopark in Supporting Local Economic Development

According to Leigh & Blakely (2017), the success of local economic development can be seen from several indicators, namely: first, the expansion of opportunities for small communities in employment and business opportunities; second, the expansion for the community to increase income; third, the empowerment of micro and small business institutions in the production and marketing process; and fourth, institutional empowerment of partnership networks between the government, the private sector, and local communities. (Saragih, 2019) says that the LED strategy has two main objectives. The first is the increase in people's income, and the second is the expansion of local job opportunities (enhancement of people's income and local job opportunities).

Expanding opportunities for small communities in employment and business opportunities

BBI, which was initially unable to produce fish seeds optimally when it was revitalized into a technopark, has provided most of the needs for fish seeds in Samosir Regency. The community of fishery business groups is now able to buy fish seeds of relatively good quality.
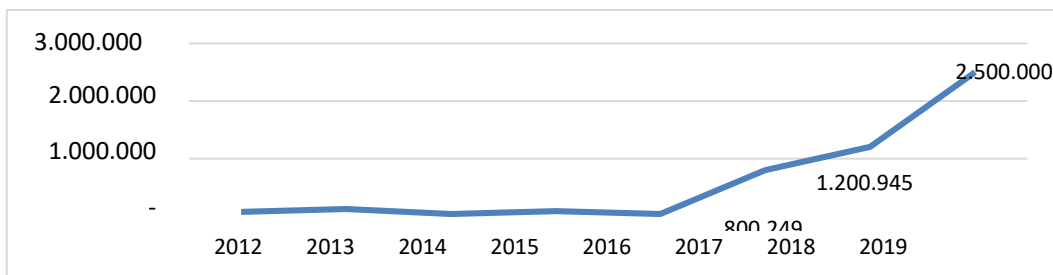

Figure 2 Growth of Fish Seed Production at BBI Samosir in 2012-2019
Source: Samosir Regent's Presentation (Situmorang, 2020)

As a direct impact of the availability of fish seeds is the emergence of business groups for fish cultivators (nursing and rearing) fish, fish processing food businesses, and service businesses providing supporting facilities and infrastructure in Samosir Regency with direct guidance from the government and academics. Number of business fields were fostered through the technopark program.

The increasing number of business fields and employment is expected to improve the community's welfare. For example, one indicator to see the welfare in a region is to look at the rate of growth of the value of the Gross Regional Domestic Product (GRDP) Per Capita. Boediono (1985) states that economic growth is also related to increased output per Capita. In table 2, it can be seen the increase in the value of GRDP per Capita in Samosir Regency from 2014 to 2019; in Figure 3, the graph it can be seen the trend of increasing the value of GRDP from year to year.

Table 1 Number of Start-ups and Labor Absorption through the Samosir Technopark Program Year 2015-2019

Business fields	Business Unit Name	Total manpower
Post Harvest Processing	Samandali	45 people
	TIC Kopi	3 people
	CV 12 Bersaudara	20 people
	Roti Ketawa	5 people
	Kacang Rondam	4 people
	Usaha Kolang-Kaling	10 people
	Bawang merah goreng	9 people
	Kripik kentang Cinabo, Kripik Pinandar	7 people
	Kopi Nature, Kaldera, Sinergi, Siringo-Ringo, Dotashi	18 people
	Usaha Buyung Sitakar	41 people
Fish Nursery	Aek Sibunga-Bunga,Saroha, Sepakat, Sipinngan Nauli	42 people
Fish Breeding	Arinta, Idonata Simbolon, Lintong Nihuta, Pardosir, Lundak Sagala, Melati Tomok	94 people
Total	**25 Business Unit**	298 people

Source: Samosir Technopark Report Document (Widiyanto et al., 2019)

Table 2 GDRP Per Capita of Samosir Regency on the basis of current prices and on the basis of constant prices

Year	Current Price	Constant Price
	Value	**Value**
2014	23 061,59	19 234, 57
2015	25 396,80	20 226, 18
2016	27 655,31	21 171, 50
2017	29 987,13	22 197, 19
2018	32 469,66	23 301, 47
2019	35 152,68	24 562, 77

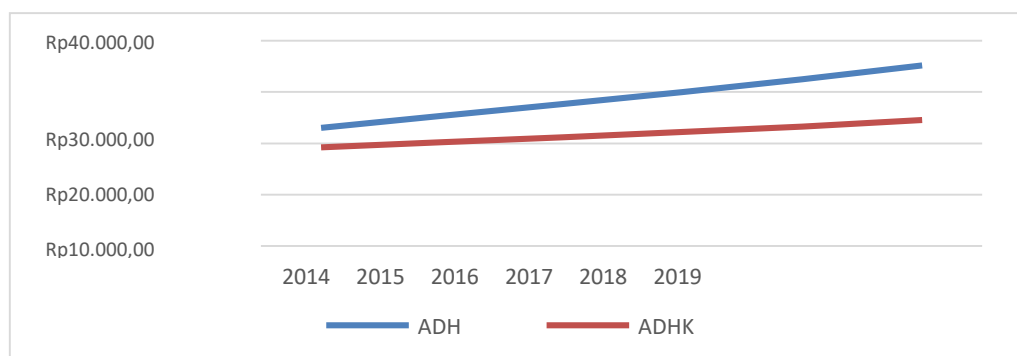Source: Samosir district statistical center (Widiyanto et al, 2019)

Figure 3 GDRP Per Capita of Samosir Regency pn the basis of current prices and on the basis of constant prices (BPS Samosir Regency, 2020)

The GDP per capita of Samosir Regency grew by 40.80 percent in the last five years. Meanwhile, when viewed from the calculation based on 2010 constant prices, namely by eliminating the effect of price increases (inflation), during the 2014-2018 period, there

was also an increase. Samosir Regency's per capita GRDP at constant prices in 2018 reached 23.30 million rupiahs. Average growth of 5.0 percent in the last five years (BPS Samosir Regency, 2020).

Expansion for Communities to Increase Income

Based on the results of research on the fish breeding process in Samosir, To increase the income of the Samosir community in the fisheries sector, academics suggested to the local government that the government change the Regional Regulation (Perda) on the sale of fish seeds which initially, fish farmers were only allowed to sell seeds with a size of 9- 12 cm for Rp. 250 per head. After further FGDs were carried out between academics, government, and fish farming groups in Samosir, a new regulation was made in the Regional Regulation that farmers may sell fish seeds of 3 (three) sizes, namely 2-3 cm (Rp. 100/head), 3 -5 cm (Rp. 200/head) and 5-7 cm (Rp. 300/head). This finding impacts the addition of fish farming business segmentation so that the velocity of money in fish seed sales transactions is fast. Communities involved in fishing also increase because of more significant and faster profits. This condition also causes market demand for fish seeds to be fulfilled more quickly.

Empowerment of Micro and Small and Medium Enterprises (MSMEs) in the Production and Marketing Process as well as partnership networks between the government, private sector, and local communities.

The empowerment of MSMEs is carried out with guidance related to PIRT (Home Industry Company) licensing. This finding impacts the marketing process with a broader reach in one district. In 2017 processed agricultural products that have received a PIRT number are only 1 product. With the guidance from BP POM and the North Sumatra Provincial MUI, in collaboration with the Samosir Technopark and the Samosir Regency Manpower, Cooperative, and UMKM Office, in 2018, the PIRT permit increased to 8 processed products. Then in 2019, the PIRT permits increased to 30 MSME products.

Meanwhile, on indicators of the cooperation network that has been built, partnerships have been carried out with local Universities and Fisheries Vocational Schools. Several collaborated universities include Medan State University, Agricultural Vocational High School, Nomensen University, and North Sumatra University. Until now, the Technopark Samsosir model has several tools for relatively complete water quality analysis. It is hoped that the Samosir Technopark Model can also open networks with other related institutions, in this case significantly increasing collaboration networks with industrial groups, local entrepreneurs, hotels, communities, and local media.

Stakeholder Analysis at Technopark Samosir

Harmonization, empowerment, and partnership networks between actors (Government, Local Government, business, communities, and universities) are essential principles and steps in developing the local economy (Coffey & Polese, 1984; Esteves et al., 2021; Roxas et al., 2020; Yasir et al., 2021). A technopark institution requires multi-stakeholder

collaboration, including local Government, academics, business sector, community, and media, in implementing the technopark program. This finding is in line with the concept of local economic development, which emphasizes the process of area/location-based economic development through collaboration between the Government, the community, and the private sector ("market") to optimize the use of local resources to improve the welfare of the community as a whole (Blakely, 2002). Therefore, a stakeholder analysis is needed to realize a local economic development strategy.

To know the role of each stakeholder, in the Technopark institution, 5 (five) stakeholders are involved in the management of Technopark, including the Samosir district government, academia, the business sector/MSMEs, the community, and the media. According to Schmeer (1999), stakeholders in a process are actors (individuals, groups, or institutions) who have an interest in a policy or program that will be or is being implemented. Based on the results of analysis, observation, and in-depth interviews, the role of each actor in the collaborative management of technoparks can be seen in the following table:

Table 3 Identification of Stakeholders at Technopark Samosir

No	Actor	agency	Role in Institutions Technopark
1	Regional Government of Samosir . Regency	Regional Development Planning Agency (BAPPEDA); Regional Secretary (Sekda); Department of Agriculture, Fisheries, and Livestock; Office of Cooperatives and Small Business;	Budget provider Provider of infrastructure, facilities, infrastructure Facilitating and coordinating the implementation of the technopark program
2	Academics	LIPI Researcher	Technology provider Provider of professional staff Guidance, training and coaching
3	Business Sector	Start ups/Starting Companies; MSMEs; field entrepreneur aquaculture	technology user mentoring, training and coaching participants
4	(MSME)	Farmers	technology user mentoring, training and coaching participants
5	Community	local newspapers; PR Samosir Regency Government; LIPI Public Relations	Technopark program news

Based on the results of stakeholder identification in table 3, it can be seen that there are five stakeholders connected to the technopark institution. For local government actors, the role that has been carried out has been exceptionally well carried out, by being the driving force, both in terms of initiating technopark development, providing budget, and also a facilitator in implementing the technopark program, likewise, in terms of academics as a technology provider and community development and training. However, when viewed from the side of other actors, namely, the business sector, the community, and the media, the roles of the three actors are still passive. In a collaboration forum, the

interaction between actors is essential because it benefits the region in solving local problems, formulating regional development, facilitating decision-making, and strengthening networks and system innovation. (Supriyadi, 2012). The business sector, in this case, startups and MSMEs, is only a technology user. This improvement causes the development of startups and SMEs to be slower. Supposedly, the business sector needs to be involved in providing input and planning, especially in the technology development process. This result is as expressed by Fukuyama (1995). An interactive planning process can help generate independent behaviour, mutualistic schemes, and trust as a 'radius of trust.

Local forums need to be built as the basis for the collective activities of several community members (ABGC) who are bound together and think together to contribute to each other. Local forums are small communities responsible for advancing the region and encouraging local economic activities. (Supriyadi, 2012). Cooperation with many industries also helps create industrial clusters that can significantly assist in developing local economies based on regional potential. In addition, from the community side, community leaders and leaders need to be actively involved in the management of technoparks so that they can attract many people to be active in technopark programs. The media, in this case, is expected not only to play a role in reporting on the technopark program, but the emphasis on the role of the media is to assist in the marketing process of technopark products.

Strategy Formulation

The strategy formulation in this study will use the ANP method. The ANP method requires a decision analysis process by grouping criteria before deciding on a choice from various alternatives. The flow of research and grouping that is trying to be built starts from mapping the problem, recommending solutions, and developing program strategies. Each input variable is sourced from the literature review, results of the FGD, and interview process with the respondents. Based on this, the mapping of criteria/sub-criteria or alternatives in this study can be seen in the following ANP network.

In implementing problem-solving, ANP relies on existing alternatives and criteria. Saaty (2008) also explained the technical analysis of ANP by pairwise comparisons of project alternatives and criteria. The preparation of the strategy in this study will use the ANP method. The ANP method requires a decision analysis process by grouping criteria before deciding on a choice from the various alternatives. Criteria show the problem definition in a concrete form and are sometimes considered as goals to be achieved. Analysis of the assessment criteria is carried out to obtain a set of measurement standards, to then be used to compare various alternatives. Therefore, to obtain a local economic development strategy through technopark development, it is necessary to map problems, solutions, and alternatives to produce a model that represents the interrelationships between criteria/sub-criteria or alternatives so that the selection of the most appropriate strategy is obtained. The research flow and groupings that are trying to be built starting from mapping the problems, recommending solutions, and program development strategies. Each variable input is sourced from literature reviews, FGD results, and in-depth

interviews with the respondents. Based on this, the mapping of criteria/sub-criteria or alternatives in this study can be seen in Figure 4.
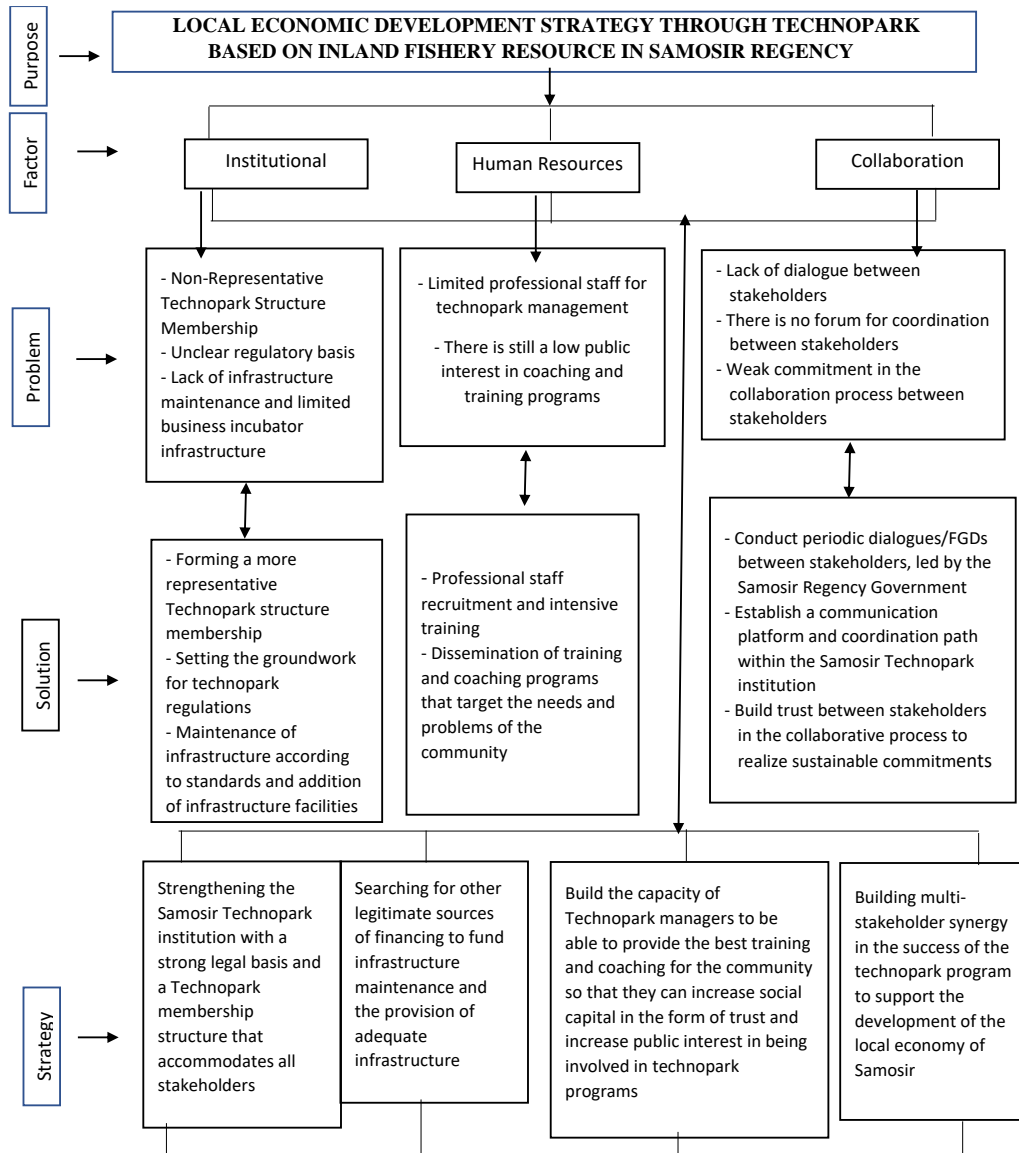

Figure 4 ANP Network Structure

Determination of the intensity value of the interest of the technopark expert respondents for each linkage in the pairwise comparison questionnaire was carried out using the help of Ms. software. Excel 2013. Determination of the priority vector, consistency ratio (CR), unweighted Supermatrix, weighted Supermatrix, limiting matrix, and normalization of the limiting matrix is done with the help of Super Decision software. After all pairwise comparison values are entered, the unweighted, weighted, and limit matrices are obtained. The value on the limit matrix is a priority value that shows the weight of each sub-criteria. Reducing or adding criteria or sub-criteria will significantly affect the

weighting results. Three supermatrixes are formed: unweighted Supermatrix, weighted Supermatrix, and limit Supermatrix. The effect of Supermatrix on research results:

Unweighted Supermatrix: In an unweighted supermatrix, two things can be seen, namely whether or not there is an influence interaction between sub-criteria and how significant the effect is. The value in the unweighted matrix will be 1 in each cluster.

Weighted Supermatrix: Comparison of the value of the effect of one sub-criteria on other sub-criteria in the weighted Supermatrix is not different from the value in the unweighted Supermatrix

Limit matrix: The limiting supermatrix cell value is obtained from the exponential results of each cell value in the unweighted Supermatrix with each cell value of its own. The value on the limiting Supermatrix is the value of the results of ANP processing as the basis for determining priority criteria and strategies for local economic development through technopark development.

Factors Influencing Local Economic Development Strategy through Technopark Development

According to Bangsa (2019), the institutional factor of a Techno Park is one of the keys to the success of creating technology-based innovations in the region. According to Sanz in Anttiroiko (2004), a Technology Park or Science Park must be managed by a professional team. Furthermore, Sanz said that collaboration factors are needed in a technopark to create a good and permanent network system between various actors. Based on the opinion of the respondents who were processed in the super decision application, each factor has a different geometric mean (GMK). Of the three factors, the greatest GMK value is the collaboration factor of 0.53961. It identifies that the most influential factor in the local economic development strategy through technopark development is the collaboration factor between stakeholders. Meanwhile, the HR factor is the second priority factor with a GMK value of 0.29696, and the smallest GMK value is the institutional factor with a value of 0.16342. The limit of the inconsistency value used in this study is a maximum of 0.10. The inconsistency value resulting from the assessment data on the factor aspect is 0.00885, so it can be concluded that the assessment process is quite consistent. The W value generated from the rater agreement calculation mechanism is 0.48, which means that 48% of respondents agree that the collaboration factor is a priority factor in the local economic development strategy through the development of technoparks in the Samosir Regency.

Problem Aspect Analysis

Based on the results of the ANP analysis on the super decision, the priority problems in the local economic development strategy through the development of technoparks on the institutional aspect are the problem of infrastructure limitations with a geomean value of 0.42857. In the HR aspect, the problem of low public interest in coaching and training programs is a priority problem in HR that must be resolved with a geomean value

of 0.66666. Meanwhile, in collaboration, the problem of weak commitment between stakeholders is the main problem, with a geomean value of 0.68334. Collaboration between stakeholders is the key to the successful implementation of the program in technoparks. According to Bangsa (2019), the stakeholders of a technopark are the government (usually local governments), the research community (academics), and the business and financial communities. Stakeholders work together to integrate the use and utilization of commercial buildings, research facilities, and conference centres into hotels. The inconsistency value in the problem selection criteria is 002365, still below 0.1, indicating that the respondent's assessment process is relatively consistent.

Solution Aspect Analysis

Based on the data processing that has been carried out, the main priority for institutional solutions is the procurement and maintenance of infrastructure according to standards and the addition of infrastructure facilities with a geomean value of 0.44862. As for the solution for determining the legal basis for technoparks, it ranks second, with a geomean value that is not much different, namely 0.40852, and the third is technopark managers who are not only filled by the local government but also representatives of relevant stakeholders, get a geomean value of 0, 14286. Meanwhile, the main priority for HR solutions is the socialization of training and coaching programs that target the needs and problems of the community with geomean values of 0,66663. As for the solution for recruiting professionals, it ranks second, with a geomean value of 0.33337. In collaboration solutions, the main priority is building trust between stakeholders in the collaboration process with a geomean value of 0.68344. As for the solution to build a communication container, it ranks second, with a geomean value of 0, 19981, and a solution for periodic FGD implementation ranks third with a geomean value of 0.11685.

Table 4 Priority Problems and Solution Processed Results Super Decision Application

No	Problem	Value	No	Solution	Value
1	Infrastructure limitations	0.42857	1	Establishing the legal basis	0.42857
2	membership is not representative	0.14286	2	infrastructure maintenance	0.42857
3	unclear rules	0.42857	3	Representative structure	0.14286
4	lack of dialogue	0.11685	4	FGD	0.11685
5	lack of commitment	0.68334	5	Trust between stakeholders	0.68334
6	no communication platform	0.19881	6	Forming a communication platform	0.19981
7	low interest in coaching and training	0.66667	7	Employee recruitment	0.33333
8	limited professional staff	0.33333	8	Socialization	0.66667

Source: Researcher Analysis Result Based on Superdecision App

Strategy Priority

Based on Figure 4 The final stage in grouping the ANP network is the selection of local economic development strategies through the development of marine and fishery resource-based technoparks in the Samosir Regency. The strategy formulation started with an analysis of the literature review and the interview process with the respondents. Based on the data processing results using the ANP method, the main priority of the strategy is to build multi-stakeholder synergy in the success of the technopark program to support local economic development in Samosir with a geometric mean value of 0.46730. These results indicate that the synergy between actors is the key to the success of local economic development.

Several studies explain the need for synergies between actor activities and policy synergies with the instruments used are resource mobilization, network areas, clusters, formal and informal associations, and are community-driven on the concept of local economic development (Atkočiūnienė & Vaznonienė, 2019; Iwara & Kilonzo, 2022; Nordberg et al., 2020)

The second strategic priority is the search for other legitimate sources of financing to fund infrastructure maintenance and the provision of adequate infrastructure with a geometric mean value of 0.27718. The third strategic priority is to build the capacity of Technopark managers to provide the best training and coaching for the community, to increase social capital in the form of trust, and increase public interest in being involved in technopark programs with a geometric mean value of 0.16009 This is in line with one of the studies which revealed that to build a technopark, capable human resources are needed (Wolniak et al., 2019). The fourth priority is strengthening the Samosir Technopark institution with a solid legal basis and a Technopark membership structure that accommodates all stakeholders. The inconsistency value in the respondent's answer is 0.0160, still below 0.1, which means that the respondent's answer is consistent. The W value obtained from the rater agreement formula calculation is 0.47. Therefore, the respondent's level of agreement on the priority strategy is 47 percent. Strengthening institutions based on the law will create structural clarity in technoparks, so they can maximize output due to a good chain of command (Böyükaslan & Özkara, 2022).
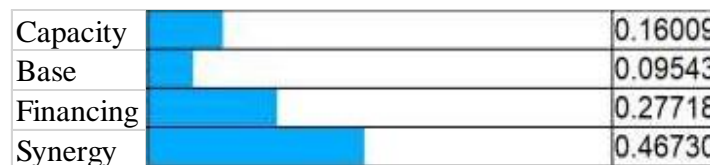
Capacity		0.16009
Base		0.09543
Financing		0.27718
Synergy		0.46730

Figure 5 Priority of Local Economic Development Strategy through Technopark in Samosir Regency based on Superdecision App

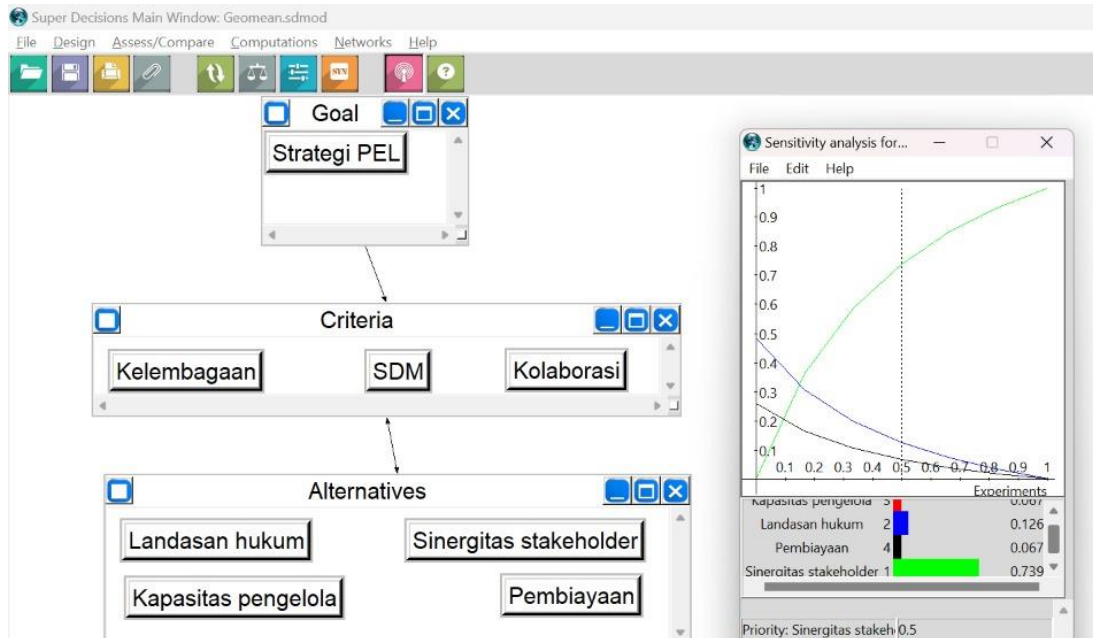**Sensitivity Analysis**

Figure 6 Sensitivity Analysis based on Superdecision App

Sensitivity analysis was carried out using Super Decisions software by changing the weight value of the criteria on the tested alternatives. In this test, changing the value of the weight of the requirements on the other options tested will affect the results of the actual ranking or not. If there is a point where there is a change in ranking/priority, then that point is called the critical point of an alternative. From the sensitivity analysis results of the sub-criteria, changes in the weight of the sub-criteria will affect the decision recommendations. However, the dominant change in weight recommends multi-stakeholder synergy compared to the legal basis and management capacity.

The primary/critical criterion that gets the highest priority in selecting an alternative Local Economic Development Strategy through Aquatic and Fishery Resources-Based Technopark Development in Samosir Regency is the criterion of building technopark stakeholder synergy with a priority weight value of 0.46730. Sequentially the criteria for determining the Local Economic Development Strategy through the Development of Aquatic and Fishery Resources-Based Technoparks in Samosir Regency are the search for other sources of financing/sponsorship. Moreover, building the capacity of technopark managers, the smallest priority weighting is the adjustment of the legal basis in establishing the Samosir Technopark.

Conclusion

The technopark program supporting local economic development in Samosir Regency, including expanding employment, increasing income, increasing welfare, and helping to

empower micro, small and medium institutions in Samosir Regency. Constraints currently being faced include the development of business units being fostered. Only a few units can still run. They are facing problems with capital, infrastructure capacity, and infrastructure facilities at technopark business incubation centers that need to be improved, hindering startup companies from developing.

Based on the results of the stakeholder analysis, the roles of the three actors, namely the business sector, the community, and the media, are still seen as passive in the institutional implementation of the technopark program. Based on Analytical Network Process, The primary strategy formulation in local economic development through technopark includes building multi-stakeholder synergy in the success of the technopark program to support Samosir's local economic development.

The policy implication can be inferred based on the mapping of factors, problems, and solutions in technopark institutions, as well as stakeholder analysis on the Samosir technopark institutional model, the collaboration between stakeholders is a priority that must be considered. For example, the Samosir Regency Government needs to actively involve the business sector, the community, and the media in designing the technopark program and procuring technology for the management of technopark management. The synergy between stakeholders is expected to create industrial clusters and value chains from Technopark Samosir so that they can significantly assist in developing the local economy based on regional potential.

The weakness of this research is the lack of output of the Samosir technopark, for example, the lack of value chain analysis because the technopark industry cluster itself has not yet been formed. Future research is expected to conduct research on technoparks with areas similar to Samosir to improve aquaculture based on technoparks.

References

Anttiroiko, A-V. (2004). Editorial: Global competition of high-tech centres. *International Journal of Technology Management, 28*(3-6), 289-323.

Atkočiūnienė, V., & Vaznonienė, G. (2019). Smart Village Development Principles and Driving Forces: The Case of Lithuania. *European Countryside, 11*(4), 497–516. https://doi.org/10.2478/euco-2019-0028

Awan, U., Arnold, M. G., & Gölgeci, I. (2020). Enhancing green product and process innovation: Towards an integrative framework of knowledge acquisition and environmental investment. *Business Strategy and the Environment, 30*(2), 1283–1295. Portico. https://doi.org/10.1002/bse.2684

Bangsa, R. (2019). Identifikasi Tipologi Techno Park dan Penilaian Techno Park di Indonesia. *Thesis*. Universitas Komputer Indonesia.

Böyükaslan, H. D., & Özkara, B. (2022). The Emergence of Technoparks as a New Organizational Form: A Study from The Perspective of Coevolution. *Ege Akademik Bakis (Ege Academic Review)*. https://doi.org/10.21121/eab.988235

Coffey, W. J., & Polèse, M. (1985). Local development: Conceptual bases and policy implications. *Regional Studies, 19*(2), 85–93. https://doi.org/10.1080/09595238500185101

Esteves, A. M., Genus, A., Henfrey, T., Penha‑Lopes, G., & East, M. (2021). Sustainable entrepreneurship and the Sustainable Development Goals: Community‑led initiatives, the social solidarity economy and commons ecologies. *Business Strategy and the Environment, 30*(3), 1423–1435. https://doi.org/10.1002/bse.2706

Ferronato, N., Rada, E. C., Gorritty Portillo, M. A., Cioca, L. I., Ragazzi, M., & Torretta, V. (2019). Introduction of the circular economy within developing regions: A comparative analysis of advantages and opportunities for waste valorization. *Journal of Environmental Management, 230*, 366–378. https://doi.org/10.1016/j.jenvman.2018.09.095

Frey, B. B. (2018). *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*. https://doi.org/10.4135/9781506326139

Iwara, I. O., & Kilonzo, B. M. (2022). Towards a Conceptual Understanding of an Effective Rural-Based Entrepreneurial University in South Africa. *Social Sciences, 11*(9), 388. https://doi.org/10.3390/socsci11090388

Janeš, A., & Begičević Ređep, N. (2018). Differences in prioritization of the BSC's strategic goals using AHP and ANP methods. *Journal of Information and Organizational Sciences, 42*(2), 193–217. https://doi.org/10.31341/jios.42.2.3

Khan, A., Bibi, S., Lorenzo, A., Lyu, J., & Babar, Z. U. (2020). Tourism and Development in Developing Economies: A Policy Implication Perspective. *Sustainability, 12*(4), 1618. https://doi.org/10.3390/su12041618

Kiseľáková, D., Šofranková, B., Gombár, M., Čabinová, V., & Onuferová, E. (2019). Competitiveness and Its Impact on Sustainability, Business Environment, and Human Development of EU (28) Countries in terms of Global Multi-Criteria Indices. *Sustainability, 11*(12), 3365. https://doi.org/10.3390/su11123365

Leigh, N., & Blakely, E. (2017). *Planning Local Economic Development*. (6th Ed). Sage Publications, Inc.

LIPI. (2017). Difusi Iptek Pengelolaan Perairan dan Sumberdaya Perikanan di Kabupaten Samosir Sumatera Utara. Retrieved from http://katalog.limnologi.lipi.go.id/index.php?p=show_detail&id=1200&keywords=

Magdalena, S., & Suhatman, R. (2020). The Effect of Government Expenditures, Domestic Invesment, Foreign Invesment to the Economic Growth of Primary Sector in Central Kalimantan. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences, 3*(3), 1692–1703. https://doi.org/10.33258/birci.v3i3.1101

Magfiroh, A. N., Zairon, & Fahrudin, A. (2020). Strategi Peningkatan Efektivitas Pengelolaan Kawasan Konservasi Taman Nasional Karimunjawa. *Jurnal Ilmu dan Teknologi Kelautan Tropis, 12*(2), 369–383. https://doi.org/10.29244/jitkt.v12i2.29262

Noori, N., de Jong, M., & Hoppe, T. (2020). Towards an Integrated Framework to Measure Smart City Readiness: The Case of Iranian Cities. *Smart Cities, 3*(3), 676–704. https://doi.org/10.3390/smartcities3030035

Nordberg, K., Mariussen, Å., & Virkkala, S. (2020). Community-driven social innovation and quadruple helix coordination in rural development. Case study on LEADER group Aktion Österbotten. *Journal of Rural Studies, 79*, 157–168. https://doi.org/10.1016/j.jrurstud.2020.08.001

Polnaya, G., & Darwanto, D. (2015). Pengembangan Ekonomi Lokal Untuk Meningkatkan Daya Saing Pada UKM Ekonomi Kreatif Batik Bakaran di Pati, Jawa Tengah. *Jurnal Bisnis dan Ekonomi, 22*(1), 1-10. Retrieved from https://www.unisbank.ac.id/ojs/index.php/fe3/article/view/4118

Prambadi, G. A. (2021). Sejumlah Ahli Jelaskan Potensi Ekonomi-Sosial Budi Daya Ikan Nila di Danau Toba. Republika Online. Retrieved from

https://www.republika.co.id/berita/r48krt456/sejumlah-ahli-jelaskan-potensi-ekonomisosial-budi-daya-ikan-nila-di-danau-toba

Rochwulaningsih, Y., Sulistiyono, S. T., Masruroh, N. N., & Maulany, N. N. (2019). Marine policy basis of Indonesia as a maritime state: The importance of integrated economy. *Marine Policy, 108*, 103602. https://doi.org/10.1016/j.marpol.2019.103602

Rokhmat, D. F., & Paskarina, C. (2021). Analisis Inovasi Birokrasi di Unit Pelaksana Teknis (UPT) Cimahi Techno Park. *Jurnal Caraka Prabu, 5*(2), 141–162. https://doi.org/10.36859/jcp.v5i2.559

Roxas, F. M. Y., Rivera, J. P. R., & Gutierrez, E. L. M. (2020). Mapping stakeholders' roles in governing sustainable tourism destinations. *Journal of Hospitality and Tourism Management, 45*, 387–398. https://doi.org/10.1016/j.jhtm.2020.09.005

Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences, 1*(1), 83. https://doi.org/10.1504/ijssci.2008.017590

Sabirov, O. S. (2021). Improving Ways to Increase the Attitude of the Investment Environment. *Revista Gestão Inovação e Tecnologias, 11*(2), 1961–1975. https://doi.org/10.47059/revistageintec.v11i2.1811

Saragih, J. F. (2019). The Role of Arabica Coffee in Local Economic Development in Highland of Simalungun District, North Sumatera, Indonesia. *Proceedings of the 1st International Conference on Life, Innovation, Change and Knowledge (ICLICK 2018).* https://doi.org/10.2991/iclick-18.2019.53

Schroeder, P., Anggraeni, K., & Weber, U. (2018). The Relevance of Circular Economy Practices to the Sustainable Development Goals. *Journal of Industrial Ecology, 23*(1), 77–95. https://doi.org/10.1111/jiec.12732

Seo, J. (2013). Creating Start-ups through Technology Transfer in Science Technology Park: A Case Study of Daedeok Innopolis. *World Technopolis Review, 2*(1), 21–31. https://doi.org/10.7165/wtr2013.2.1.21

Sijabat, T. (2018). BBI Samosir Pasok 15% Kebutuhan Ikan. *Medan Bisnis Daily*.

Situmorang, S. (2020). Strategi Pengelolaan Technopark Samosir untuk Peningkatan Ekonomi Lokal di Masa Pandemi [Presentation from the Director of Technopark].

Song, M., Xie, Q., Wang, S., & Zhou, L. (2021). Intensity of environmental regulation and environmentally biased technology in the employment market. *Omega, 100*, 102201. https://doi.org/10.1016/j.omega.2020.102201

Sudiyatno, S., & Wulandari, I. (2020). Evaluation of education and training programs in Solo Technopark Central Java in Indonesia. *REID (Research and Evaluation in Education), 6*(2), 150-159. Retrieved from https://journal.uny.ac.id/index.php/reid/article/view/36794

Supriyadi, R. E. (2012). Local Economic Development And Triple Helix: Lesson Learned From Role of Universities In Higher Education Town of Jatinangor, West Java, Indonesia. *Procedia - Social and Behavioral Sciences, 52*, 299–306. https://doi.org/10.1016/j.sbspro.2012.09.467

Suriyankietkaew, S., & Nimsai, S. (2021). COVID-19 Impacts and Sustainability Strategies for Regional Recovery in Southeast Asia: Challenges and Opportunities. *Sustainability, 13*(16), 8907. https://doi.org/10.3390/su13168907

Tello, M. D. (2011). From national to local economic development: theoretical issues. *Cepal Review, 2010*(102), 49–65. https://doi.org/10.18356/bf5d1be2-en

Widiyanto, T., Shohihah, H., Riyanto, W., & Sudiyono, B. T. (2019). Pengembangan Technopark Pengelolaan Perairan dan Sumber Daya Perikanan di Kabupaten Samosir. Retrieved from http://lipi.go.id/publikasi/pengembangan-technopark-pengelolaan-perairan-dan-sumber-daya-perikanan-di-kabupaten-samosir/21525

Wilson, J. R. (2019). Cluster policy resilience: new challenges for a mature policy. *International Journal of Business Environment, 10*(4), 371. https://doi.org/10.1504/ijbe.2019.101642

Wolniak, R., Grebski, M. E., & Skotnicka-Zasadzień, B. (2019). Comparative Analysis of the Level of Satisfaction with the Services Received at the Business Incubators (Hazleton, PA, USA and Gliwice, Poland). *Sustainability, 11*(10), 2889. https://doi.org/10.3390/su11102889

Yasir, Y., Firzal, Y., Sulistyani, A., & Yesicha, C. (2021). Penta Helix Communication Model Through Community Based Tourism (CBT) for Tourism Village Development in Koto Sentajo, Riau, Indonesia. *GeoJournal of Tourism and Geosites, 37*(3), 851–860. https://doi.org/10.30892/gtg.37316-718