

TRANSMIGRATION 4.0: IMPLEMENTATION OF INTEGRATED FUNCTIONS AND TECHNOLOGY

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ABSTRACT

Transmigration has been a complex program conducted by the Indonesian government since the colonial period. The complexity is related to economic, political, social, and cultural aspects. Government must tackle the issues and problems in transmigration. The changing goals of transmigration through periods have influenced the programs at all costs. This study proposes the implementation of transmigration 4.0 in Indonesia. The new concept of transmigration in the Industry 4.0 era emerges as the integration of functions and connections on the macro scale and micro scale through developing area units. The program adheres to national and regional development planning. Two types of data were collected for this study: primary and secondary. Interviews, focus group discussions (FGD), and other technical field surveys were used for primary data collecting. The outcome demonstrates that agricultural primary products, which are cashews, coconut, and corn, can improve economic productivity. The cultivation and production require the participation of migrants and local people. The process needs an integrated place called Trans Science Techno Park (TSTP). TSTP is an agricultural science techno park located in a transmigration region. Transmigration region in Muna Regency, Southeast Sulawesi Province, will have TSTP as pentahelix collaboration consisting of ICT media for digital marketing and branding, research and development, community, government, and industry. The convergence of technology and agriculture in TSTP is known as Transpolitan 4.0 and is replicable in other contexts. The core of Transpolitan is intertwined with agroproduction, agroindustry, agribusiness, agrotechnology, and agrotourism.

Keywords: *Transmigration, Transpolitan, Science Techno Park, Agriculture, Pentahelix*

1. INTRODUCTION

Today, transmigration has become an integral part of regional development along with the national development framework. The government asserted the successful realization of transmigration that generated regional development and the work ethic of local people (1). According to data from the Ministry of Health in 2018, the transmigration program has successfully built 1,183 definitive villages, 385 sub-districts, 104 cities or regencies, 48 independent integrated cities, and two provincial capitals (2). West Sulawesi and North Kalimantan were examples of successful transmigration because these two provinces were born from the program (3).

The Indonesian government has declared the transmigration program in Muna Timur Raya (Mutiarra) Muna Regency, Southeast Sulawesi Province, according to Strategic Planning of 2020-2024 of The Ministry of Villages, Development of Disadvantaged Areas, and Transmigration of the Republic of Indonesia. The regency provides three locations for the Developing Area Unit of transmigration. The infrastructure and settlement are still in progress in accordance with the national strategic planning and strategic planning of the regency.

Based on primary data in some transmigration locations, the government must struggle to complete targets related to land conditions, technical aspects of farming management, road and bridge infrastructure,

economy, and social aspects (3). The unfulfilled targets could become problems in the transmigration department, which could reduce the trust in society in the transmigration program and increase concerns about the impacts and issues. The Indonesian government has been working on these efforts. Based on the experience of Ranakolong Village in East Manggarai Regency, the infrastructure and welfare remain poor (4).

1.1. Brief Story of Transmigration in Indonesia

The Dutch colonial government had initiated transmigration in Indonesia in 1905 (5). It was mentioned in 1927 by President Sukarno in the *Soeloeh Indonesia Daily* (6). Subsequently, at the Economic Conference 1946 in Yogyakarta, Vice President Hatta assured the importance of transmigration to support industrialization outside Java (7). Indonesia's Transmigration Program was launched at the beginning of Indonesia's sovereignty on 12 December 1950 (8). The first transmigration program settled 98 people within 25 families in Lampung and Lubuk Linggau (Southern Sumatera) (9,10).

Transmigration continued in the New Order phase of the Indonesian government. Titus (1992) and Adhiati et al. (2001) asserted the major aims of the transmigration policy in the New Order of the Indonesian Government. The aims were to achieve equitable population, labor distribution, and resource development in the outer islands, alleviate poverty and economic obstacles, improve living quality and regional development, and integrate national unity and security (11,12). Transmigration accommodated labor transactions to receiving districts as economic rather than social or environmental matters (12).

Transmigration settlements accommodate the local community to collaborate with the migrants. Local people have intrinsic capabilities and direct access to traditional management of natural resources, human resources, and the environment. These are the potencies and possibilities for a successful way forward of transmigration programs (13,14). Local people live in social-traditional settlements. The social-residential environment is key in improving the quality of life towards social sustainability (15). One of the factors in the social-residential environment is social interaction. Social interactions produce social capital, which is essential for social sustainability. Transmigration programs can implement residential environments through social and competent interactions between techs and local people. The social-cultural basis

strengthens local government development as a guide to arranging government development strategies (16).

1.2. The Main Challenges in Transmigration

Amid the increasing reputation of transmigration, criticisms have been going up concerning conventional programs without new perspectives. Land clearing for land use alteration should have considered the potency of land and the needs of transmigration. Land use was determined without a good understanding of the environment and cultivation.

Another problem arose, as the old concept of transmigration was considered a stigma of transferring unskilled or poor people. The labor force and their capabilities were unsuitable and undereducated to the agriculture, industry, trade, and service business. In some cases, the migrants are categorized as underprivileged. They work in temporary and casual jobs, although they entirely rely on farming (17). The migrants rapidly experienced a cycle of poverty because of low efforts in competing, and social-economic problems in a shorter cycle repetition (18).

Nature and local people acquire the impacts of transmigration. The complexity of human-nature interdependence can trigger a conflict of interest. Local people also fear the economic gap and social problems caused by the government's support and lack of social cohesion. The local population in the receiving areas is often subordinated to the transmigration scheme (19). These disadvantages cause poor interaction with local people. Some transmigration deployments failed to create an equitable population and development because the investment was unaccommodated. Meanwhile, the process of interaction and integration of migrants and the local population experienced cultural changes and adaptation, although differences in views and conflicts still happened.

The primary aims of the transmigration policy in the New Order of the Indonesian Government were to achieve equitable population, labor distribution, and resource development in the outer islands, to alleviate poverty and economic obstacles, to improve living quality and regional development, and finally to integrate national unity and security (15). Since the New Order, transmigration has had direct control from the ministry. The national government determined location and migrants. However, this policy caused conflicts with local people because fewer

approaches to the programs existed. The agriculture products encountered difficulties in marketing. Consequently, transmigration has been excluded from the national medium-term development plan 2019-2024.

1.3. The Aims of Study

This study proposes a concept of transmigration 4.0 to create the synergy of transmigration and technology. The implementation of concept is the spatial designs in terms of land use planning, collaborative functions, and progressive networks in the transmigration region of Muna Timur Raya, Muna Regency, Southeast Sulawesi Province. Features of location in Muna determine the design in macro and micro scales.

The research objectives are a) to implement the connection between transmigration 4.0 and ICT in terms of transmigration scheme, building function, and potential interconnection between transmigration developing area units, b) to create networking between stakeholders, and c) to choose better approaches for local people participation.

2. METHODS

Data collection consisted of primary and secondary data. Social economy and ecological data are projected to describe the factors of issues. The primary data collection relied on technical activities in field surveys, including interviews and focus group discussions (FGD). The field surveys were conducted in different locations and at different levels of transmigration stakeholders. The interviews were conducted for people in the community, whereas the FGD was for related agencies in Muna Local Government. The field surveys also collected data on the existing environments, such as physical conditions, landscape conditions, agricultural products, human activity, infrastructure, and local settlements.

The qualitative analysis compared the literature study and primary data to generate categories of building functions and spatial organization based on the potencies and needs. The quantitative analysis managed data to determine agriculture potential products and the advantages for the migrants and local people. Eventually, the results raised social, economic, and agricultural potencies for planning and designing the functions and spaces to accommodate transmigration participants, local people, and cultural interaction. According to Law Number 29 of 2009, a

transmigration settlement cluster is part of a development area cluster with 300-500 families. Settlement clusters can consist of new transmigration participants, revitalized transmigration participants, and local people.

3. LITERATURE STUDY

3.1. Transmigration Policy in Indonesia

Transmigration experienced changes in program design. During the New Order in the First Five-Year Development Plan (Repelita I), the transmigration program focused on developing areas outside Java rather than reducing population density on Java Island (20). The policy was subsequently followed by the constitutions and regulations in 1972 and 1997. Law number 29 of 2009 essentially explains the definition and mechanism of transmigration.

The Ministry of Villages, Development of Disadvantaged Areas and Transmigration of the Republic of Indonesia stated the new objectives of transmigration according to strategic environmental policy. The objectives are to improve the welfare of migrants and the surrounding community, establish equitable regional development, and strengthen the nation's unity and integrity (10). Strategic policy and unity-integrity are decisions and power from the political domain to regulate and coordinate. In contrast, welfare and regional development are to make equality, interaction, and recognition in society. Furthermore, transmigration is about politics and social empowerment. This program is intended to increase cooperation and harmony between the central and regional governments regarding policy planning and regional development strategies. (Figure 1)

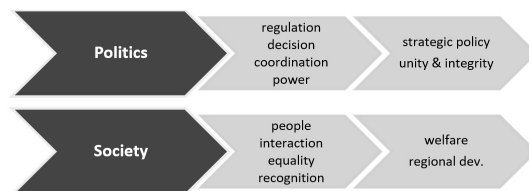


Figure 1: The Factors of Politics and Society Contributing to Transmigration

The latest regulation was Ministerial Regulation Number 5 of 2021 about Procedures of Transmigration Planning. The regulation consists of determining the transmigration region, planning, community empowerment, area development, and supervision and assistance. It also emphasizes

transmigration management for reaching out to equitable populations and development to generate regional investment. Human resources with particular competency are needed to increase human resource capacity for industry, trade, and service business. This policy can minimize conflict of interest in transmigration regions. The main goal will be accomplished: transmigration distributes the population along with equal welfare, economic distribution, and rural development (4).

Ministerial Regulation number 5 of 2021 mentions criteria of transmigration in the new era such as particular competency, business based on information communication technology, and resources and environment management. The new concept of transmigration is also stipulated in the 2020-2024 Medium-Term National Development Plan (RPJMN), which has been developing 52 transmigration sites into new cities. Transmigration must be planned and designed comprehensively and continuously within multi-aspects and smart scopes.

3.2. Transmigration in the Technology Era

Formerly, the Indonesian transmigration program aimed at building agricultural development integrated with Indonesian nationalism, prosperity, food estate, and regional development (21). The agricultural development followed an increasing population in the transmigration region to meet the food production through infrastructure for production, marketing, transport, and labor force (11). Migrants with high motivation and potential backgrounds could cultivate the crops in the new region, explore the land, implement new methods, and be involved in marketing. They are complementary to the group of ordinary migrants.

Region-based transmigration needs a unified approach to accelerate its development. The Ministry of Villages, Development of Disadvantaged Areas, and Transmigration of the Republic of Indonesia (Kementerian Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi / Kemendes PDTT) works together with relevant ministries or private parties to build the most recent technology and infrastructure. The infrastructure and telecommunications network in Transmigration 4.0 is powered by Presidential Regulation 50 of 2018 concerning the Coordination and Integration of Transmigration Implementation. Several ministries help to build infrastructures, namely the Ministry of Public Works and Housing, the

Ministry of Energy and Mineral Resources, the Coordinating Ministry for Human Development and Culture, and the Ministry of Communication and Information.

The technology era influences the transmigration program to integrate industries (22), technology, economy, and society (23). The disruptive approach in transmigration is intended to open new markets. Transmigration in era 4.0 is transforming from the conventional platform to integrating digital-online marketing and industrial productivity. In this case, the Ministry of Villages, Development of Disadvantaged Areas, and Transmigration of the Republic of Indonesia must collaborate with the Ministry of Industry. The implementation needs four accelerators: data volume, computing capability, connectivity, and analysis and business intelligence (24).

3.3. Science Techno Park (STP)

Science Techno Park (STP) is a combination of science-technology-innovation policy and industrial policy. Basically, both policies are conducted under three primary roles of cooperation: the research and development division, government, and business sector (industry and investor) (25).

The STP is a center for research development, science-technology, and human resource training. STP aims to create innovation for research-based industry. Pertinent industries can support the techno park with investment, marketing, and business processes. Industries can be the owners because they have land and essential infrastructure. Local government can support through tax relief and debt relief.

The invention in STP can be from collaboration with other stakeholders. The invention enables industries to bridge market demands, especially by using advanced technology. Network of stakeholders and community, for instance, quadruple helix (26), comprises government, industry, academia, and community. They work together to create the future and drive structural changes (27).

The Indonesian government has the 2015-2019 Science Park and Techno Park Planning guidelines. STP has been developed since 2014. Centre for Science and Technology Research (Puspiptek), the first STP, was established in 1976

3.6. Transformation of STP in Transmigration

Industry 4.0 requires changes in transmigration viewpoint and targets. The conventional transmigration will be upgraded to the transmigration 4.0 as a response to Industry 4.0 and the business scheme. Labor distribution, poverty alleviation, equitable population, resource development, and regional development are the objectives of conventional transmigration that sacrifice environment and land clearing for diverse nonintegrated goals. Transmigration is about politics and social empowerment, and the challenges demand regional development together with human empowerment, living quality improvement, and environmental ethics.

The real challenge is to plan the transmigration developing area unit in macro scale and micro scale connections while accommodating the activities as a science techno park. The suitable level for transmigration is the National Agri Science Techno Park. It is regulated through program plans and function provisions; for example, stakeholders in STP transform into stakeholders in transmigration. The migrants should be competent in information-communication-technology (ICT) for exploring knowledge, marketing, and social communication.

The research discusses the transformation of the science tech park in the transmigration developing area unit through integrated functions that are appropriate to the transmigration region of Muna Timur Raya, Muna Regency, Southeast Sulawesi Province. The implementation must respond to the needs of transmigration goals in Industry 4.0.

4. RESULTS

4.1. Developing Area Units in Batukara District

The transmigration development area in Batukara District consists of three developing area units (Satuan Kawasan Pengembangan / SKP), namely SKP-A, SKP-B, and SKP-C. The Ministry and local government set up development planning for each SKP. The planning includes the number of heads of family, land tenure, land use, land division, and participation of local people. Figure 3 shows the location and existing land of each SKP based on geographic mapping and analysis. Mostly, the land is forest, followed by plantation. The forest is classified as protection forest and its wildlife. The plantation specializes in coconut, corn, and cashews.

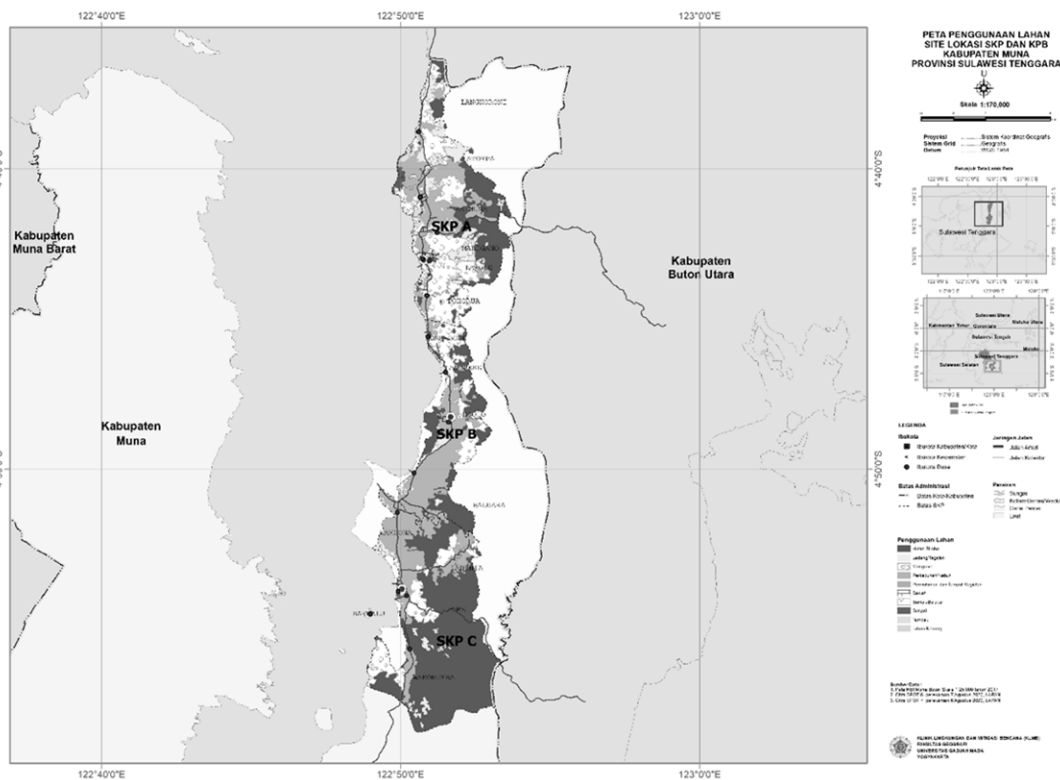


Figure 3: Land Use Map of Entire SKP

SKP-A has an area of approximately 6,000 hectares, and SKP-B has approx. 3,500 hectares, and SKP-C has approx. 7,100 hectares. SKP A has been inhabited by approx. 20 heads of families with minimum infrastructure (Figure 4). SKP C is still unoccupied. The upcoming development planning focuses on SKP-B Moolo Subdistrict, Batukara District, from 2019 to 2024. SKP-B is located in between SKP-A and SKP-C. The uniqueness of topography in SKP B, which is close to the sea and protection forest, can induce the specialties of this area. This position could generate development in those SKPs when SKP-B starts its development planning. The ministry and local government have initiated field coordination with local people as the landowners and participants.



Figure 4: Migrant's house and transmigration settlement in Maligano Regency (SKP-A), Muna, Southeast Sulawesi

Source: Field survey, 11 October 2019

Batukara District has topographical uniqueness because it has sea on the west and hills on the east. This topography influences the characteristics of slopes and elevation. A national road is also spreading along the district from north to south near the sea. The SKPs are located beside the road.

Data on slope areas in relief maps are essential because land use divisions can be created based on these. This is possible because relief maps can describe the shape or profile of the earth's surface. This is shown by variations in the density of contour lines on the map. The regional slope level is delineated or grouped into five levels based on the two maps (Figure 5).

Table 1: Data on the Slope Area of Batukara District.

No.	Slope	Area (Ha)	Percentage (%)
1.	0–8%	1,666.11	20.14
2.	8–15%	1,038.27	12.55
3.	15–25%	1,935.87	23.40
4.	25–45%	2,814.96	34.02
5.	> 45%	819.21	9.90
TOTAL		8,274.42	100.00

Based on Table 1, more than 40% of the Batukara District area has very steep slopes. Meanwhile, there are approximately 35% in flat to gentle slopes and approximately 25% have moderate slopes. The slopes influence the design of landscapes and buildings.

Elevation in the Batukara District area ranges from 0 to 732 meters above sea level. Figure 5a shows an area with a low altitude with a green and light contour in the coastal area and is relatively parallel to the coastline. Areas classified as high and very high are in the central and eastern parts of the Batukara District administrative area. The height figures are adjusted to the contour map (Figure 5b). Areas with prominent height figures have dense contour lines. This indicates that these areas have relatively steep slopes.

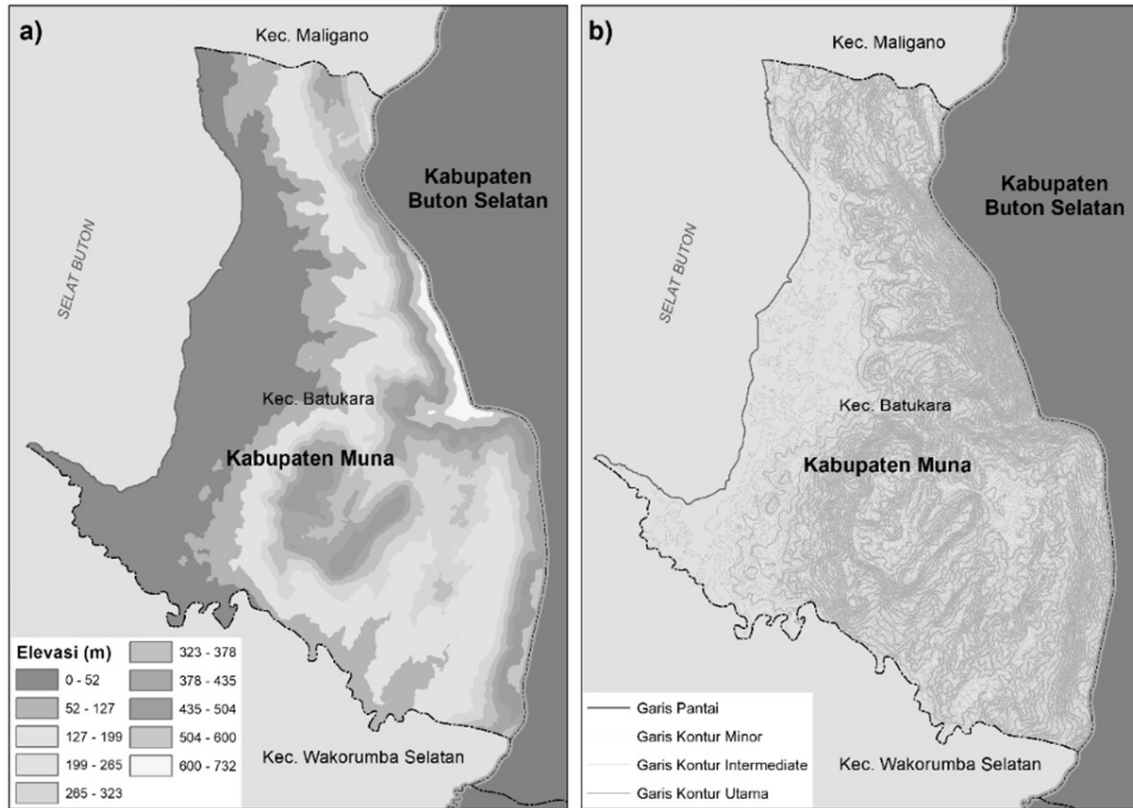


Figure 5: a) Elevation of Batukara District and b) Contour Map of Batukara District

4.2. Current Land Use in Batukara

Current land use can be used as a basis for land use planning and as a basis for development without having to damage the existing ecosystem. Existing land use data was obtained from the results of interpretation of remote sensing imagery, namely photo images obtained from photography using

drones, SPOT-6, and SPOT-7 satellite images. The results of satellite image interpretation can be compiled into a map of land use throughout the Batukara District area (Figure 6). After that, the area can be calculated for each type of landform presented (Table 2).

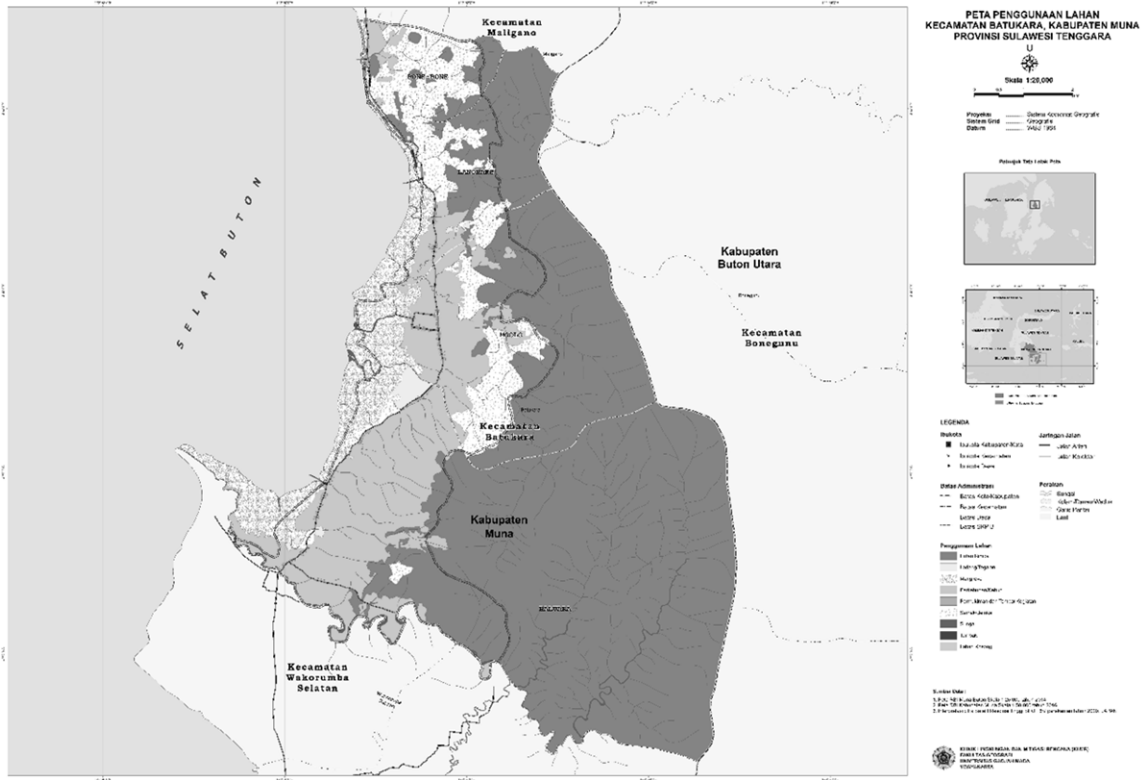


Figure 6: Batukara District Land Use Map

Table 2: Batukara District Land Use Area.

No.	Land Use	Area (Ha)	Percentage (%)
1.	Forest	5,293.15	63.97
2.	Farm/ moor	66.26	0.80
3.	Mangrove	643.99	7.78
4.	Plantation	1,444.02	17.45
5.	Settlements	37.82	0.46
6.	Shrub	737.90	8.92
7.	River	49.02	0.59
8.	Pond	1.87	0.02
9.	Bare land	0.38	0.00
TOTAL		8,274.42	100.00

Land use in the Batukara District area is dominated by forests (approx. 64%) followed by plantations (approx. 17%), shrubs (approx. 9%),

mangrove forests (approx. 8%), and fields and water areas (rivers and ponds) each having an area of approx. 1%. The forest is in the eastern part, with an average height of more than 500 meters above sea level. Towards the coastal area where the height is low, the land use is plantation interspersed with bushes. Local people have ponds for fish farming. Towards the west, cultivated land use is dominated by fields, settlements, and mangrove forests on the shores.

Moolo is a subdistrict of Batukara District where the settlement unit (Satuan Permukiman / SP) of transmigration is planned. It is also a subdistrict for the future implementation of a new concept of transmigration. Moolo will be equipped with infrastructure and supporting factors.

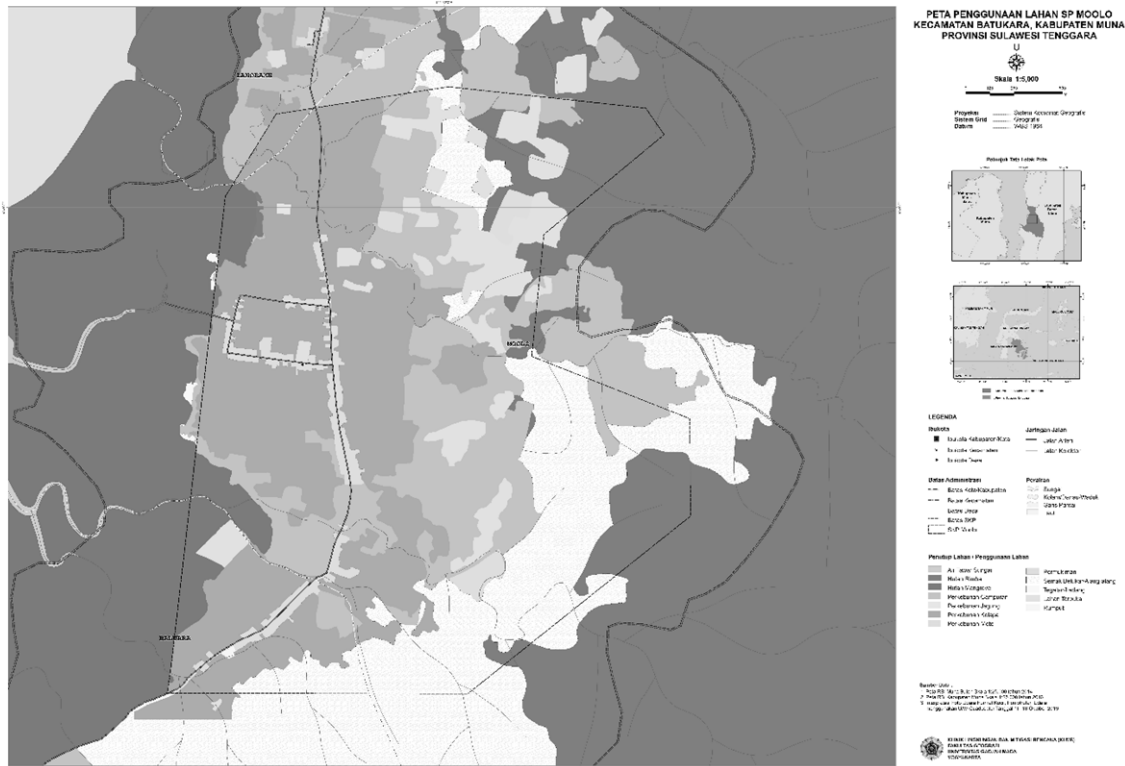


Figure 7: Moolo Settlement Unit (Satuan Pemukiman, SP) Land Use Map

The total area of SP Moolo, Batukara District, is approx. 620 Ha (Figure 7; Table 3). Only around 12% of the area is used as forest area (mangrove and forest). The possibilities for development are still relatively vast. SP Moolo has a residential area of local people whose area is around 3%. The use of plantations in SP Moolo is also quite intensive, almost 60% of the area. The types of plantations are also quite varied: corn, coconut, cashew, and others. This shows that plantations are very possible.

Cashew is the lowest area of agricultural product, although back then in Muna, cashew was a high-quality specialty. It had its branding as cashew from Muna in the market. In the future, through transmigration, it can regain its reputation.

Table 3: Land Use Area in SP Moolo, Batukara District.

No.	Land Use	Area (Ha)	Percentage (%)
1.	Mangrove	24.90	4.02
2.	Forest	51.70	8.35
3.	Open field	56.38	9.10
4.	Corn plantation	3.26	0.53
5.	Coconut plantation	220.32	35.56
6.	Cashew plantation	8.30	1.34
7.	Plantation	123.86	19.99
8.	Settlement	19.40	3.13
9.	Grass	0.90	0.14

No.	Land Use	Area (Ha)	Percentage (%)
10.	Shrubs	110.53	17.84
	TOTAL	619.55	100.00

These plantation commodities can become a regional characteristic and an icon of community-based economic development. Agriculture productions will be improved in the new concept of transmigration according to the potencies.

5. DISCUSSION

5.1. Using Technology for Economic Improvement

Transmigration is a part of politics and society because transmigration is included in national development programs. The development planning must comprise significant stakeholders for transmigration 4.0. Human resources generate social-economic welfare in harmony with good governance planning. The existence of new-concept transmigration can increase the productivity of available resources by combining the skills of migrants and the local community (36). Human resources must be ready to handle transmigration projects, especially in empowering local people.

Knowledge transfer and human resources improvement can be enhanced through technology in society. The range of technology forms is from soft skills to instruments. Innovation and invention follow the access to technology. The approach for agricultural systems and technology in transmigration is the process of research, production, and manufacturing.

A combination of economic and technological approaches can bring new solutions to tackle issues concerning transmigration and improve economic affordance. Strategies of marketing and business management blend with ICT skills as users and programmers. The implementation will uplift excellent local products to the market. The process of production and marketing will also use IT. This system can improve the economic capacity of selected products through production and marketing. The center of agricultural production also accommodates external products from other transmigration units or areas.

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Technology and the economy will influence and support each other. The economy approach provides data from analysis and business intelligence, such as business analytics (37), data mining (38), and visualization (39) to make better decisions. Business intelligence uses technology to help analyze market demand. Market demand is a study of consumers' needs before a new product or service is released (40). It is about the quantity and price of a product consumers desire and can afford. The processes are to understand the consumer's interest, determine the product, and categorize the market desire level (41). It is a technology-driven process for analyzing data and making informed business decisions (42). A reliable internal IT system in business intelligence possibly accumulates data gathering, data storage, and data analysis (43) to support information and patterns

for effective strategy, operational insights, and decision-making for future events. (Figure 8)

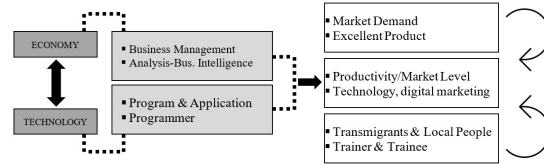


Figure 8: The Relation Between Economy and Technology in Transmigration

5.2. TSTP: Science Techno Park and Transmigration

The Ministry of Villages, Development of Disadvantaged Areas, and Transmigration of the Republic of Indonesia (Kementerian Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi - Kemendes PDRT) released a new formulation to fulfill the successful transmigration. At the end of 2019, the term Transpolitan emerged and got responses from the leaders. It is not only about quantity but also quality. Transpolitan was initiated by Prof. Dr. Suratman, M.Sc. on 17 September 2019 at Yogyakarta Transmigration National Congress 2019 (44). Transmigration must improve the quality of participants and local communities so that a transpolitan area can be established.

The new transmigration concept needs a center entitled Trans-science Techno park (TSTP) to generate surrounding regions within the terms of transpolitan (transmigration and metropolitan). The factors for stimulating the development acceleration are taken from the collaborative pentahelix working on the digital economy, market branding, excellent-skilled human resources, research and development, and innovation.

Trans-Science Techno Park (TSTP) combines science techno park and transmigration planning established for the transmigration region. The pilot project for TSTP is the transmigration region in the Mutiara Transmigration Area, Muna Regency, Southeast Sulawesi Province. It is categorized at the national level called The National Agri Science Techno Park. The main activities are research, education, industry, marketing, and ICT related to agriculture and technology. TSTP must utilize advanced technology implementation in food crop farming, plantation for horticulture, harvesting and post-harvest process, training center, and center of technology transfer for people (35).

Figure 9 shows the stages in building the idea of Transpolitan as a digital and intelligent

transmigration concept. The location will be in a regency (kabupaten) or province. The location has the potential to be a backbone of economic improvement. Step 1 is to determine the location for the innovation regional system and national development planning. Step 2 is to launch multistage production based on spatial-ecological resource input. Step 3 is the research and development to accommodate human resources and policy. Step 4 is implementing collaborative investment that can happen within pentahelix commitments. Pentahelix comprises multiple stakeholders: potential community (local people), investors, universities, media, and government. Step 5 is to establish a digital economy for supporting market branding. These five steps need a gradual period related to raw materials' financial availability and the preliminary data or study. The embryo of these steps is based on the track record of local people's productivity and potency. It is an integrated transmigration model from the new perspective in policy, planning, and management innovation.

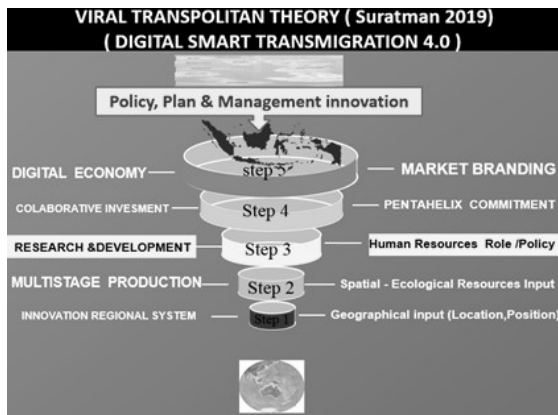


Figure 9: Digital Smart Transmigration 4.0 Transpolitan (Suratman 2020)

Pentahelix in Trans Science Techno Park is intertwined with giving and receiving (Figure 10). There is a close relationship between the stakeholders to build the system of transpolitan. Academia or university is close to community and industry. University has its role in government through the community. Media within the ICT role is responsible for education and marketing to the community and providing ICT development to the government. Meanwhile, the government boosts industry through tax relief, infrastructure, and proper regulation. The industry as a business chain stimulates industrial growth for the government and community.

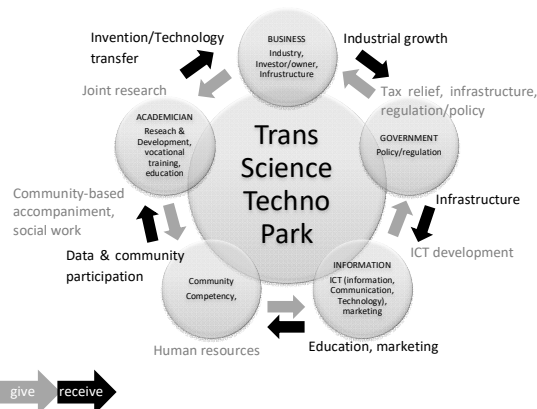


Figure 10: Pentahelix in the Contribution to Trans Science Techno Park

5.3. Conceptual Planning and Design in TSTP Transpolitan

There are five approaches in the transpolitan to accommodate the new perspective of transmigration: agroproduction, agroindustry, agribusiness, agrotechnology, and agrotourism. Agroproduction means action to produce agricultural harvesting by choosing a high-end product as an agricultural superior commodity, local superior product, or superior agricultural product (45). Agroindustry includes land and production management to give profit to the community by combining agriculture, farming, and plantation (46). Agribusiness is to create a market and profitable networking regional and export (47). Agrotechnology is to produce innovation in technology for new agricultural engineering in upstream and downstream supply chains (48). Agrotourism is to design areas for education and tourism within particular goals and public needs by 'freedom to learn' (49).

The criteria for the products are 80% of raw materials originating from the village (50,51). The product has uniqueness and local wisdom, jobs and business opportunities, and economic potential. Back then, Muna was known as cashew farming with good quality. Today, agricultural products are overtaken by corn, coconut, and banana. The production process can increase the value of cashews rather than selling them as raw material. Cashew in wet or dry conditions determines price differences. Raw material has meager prices; therefore, it is hardly affordable for harvesting. Consequently, people move to find nonagricultural jobs outside Muna.

TSTP will provide the production chain to help improve the economy for migrants and local

people. Research and development conducted by regional universities can help to increase production and improve the quality of products. ICT media creates information and branding to sell the products. The government supports industry with land and tax. The industry provides instruments and tools for processing. Subsequently, migrant and local people cultivate the best products accompanied by universities and industry.

TSTP Mutiara provides pentahelix collaboration of the academia, government, media, industry, and community. Halu Oleo University, Hasannudin University, STIP Wuna Raha, and Al-Fath-Tan Uraza Agricultural Vocational School contribute to agricultural education. The ICT media is responsible for marketing, the digital economy, and supplying the government with ICT development. The government supports industry through infrastructure, appropriate regulation, and tax relief. The community thus can be strengthened with the help of research and technology from the stakeholders, strengthening human resources and facilitating the transfer of knowledge in society.

TSTP Muna also serves as a social space for the local community to work with migrants. TSTP Mutiara also combats the stigmatized idea of transmigration in the past. It trains migrants and locals in the agriculture sector, raising the capacity of the workforce.

Mutiara Transmigration Area consists of SKP-A, SKP-B, and SKP-C. Each SKP has the potency to contribute to establishing TSTP in SKP-B. SKP-A has its roles in agroproduction in the

means of settlement and agricultural land. SKP-B is responsible for agroindustry, agribusiness, agrotourism, and agrotechnology. SKP-B also has agroproduction, especially to accommodate research-development and internship for students. SKP-C has similar roles as SKP-A, but because the location is close to the port, it is completed by the warehouse. (Figure 11)

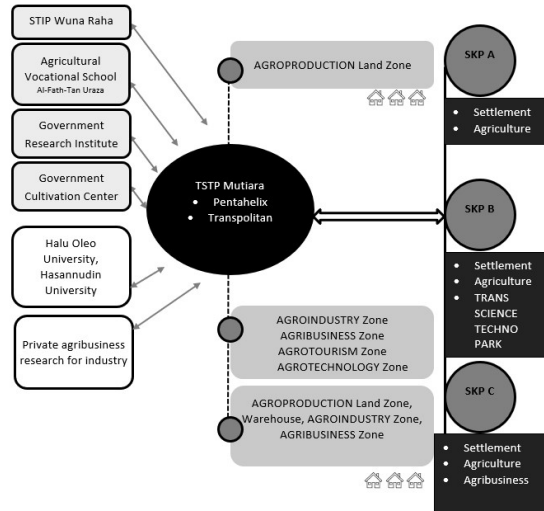


Figure 11: The Connectivity and Function between Developing Area Unit (SKP)

The functional landscape on SKP-B describes the east-west axis. The area is divided by the north-south axis formed by the National Road. The main entrance strengthens the east-west axis. This axis connects the sea and hills at the edges of TSTP Mutiara. The entrance opens to the area on the west side of SKP B, which is on the National Road. (Figure 12)

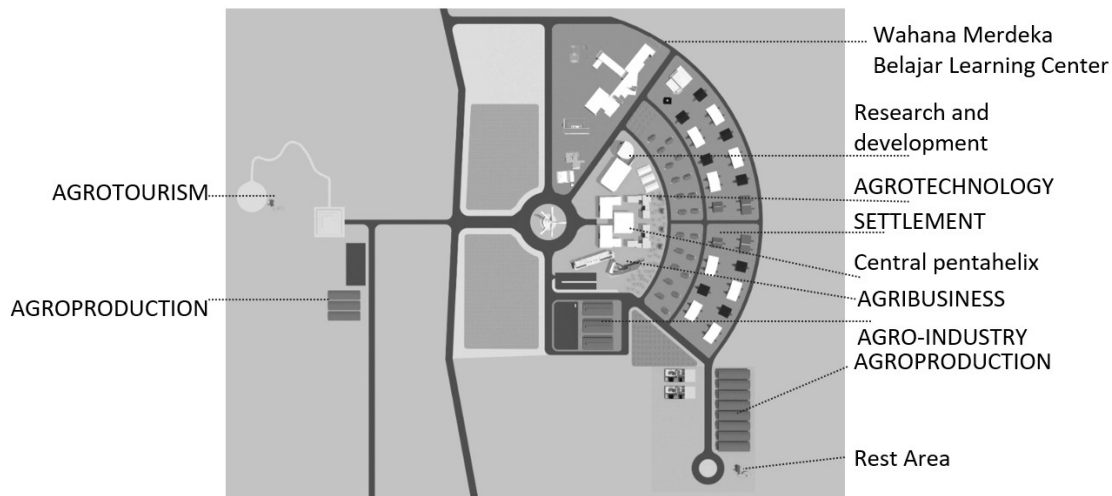


Figure 12: Zoning of TSTP Mutiara – Transpolititan 4.0

TSTP Muna's integration of industry, technology, economics, and society is influenced by the technological era. There are zones for agroproduction, agroindustry, agribusiness, agrotourism, and agrotechnology. Each pentahelix stakeholder has a role in these zones. The zones house the activities of research, education, industry, marketing, and ICT related to agriculture and technology. In effect, TSTP Muna fulfills Ministerial Regulation Number 5 of 2021 concerning Transmigration Planning Procedures, especially on community empowerment, oversight and support, and attracting investment to the area.

Transmigration area generally is pristine land. Elementary research data such as biodiversity, ownership, and land productivity must be supported by satellite imagery. Environmental documentation is also needed, for example, the migration route of a species and water springs, but the documentation hardly relies on satellite imagery. It needs field observation.

Field observation proved that legal ownership and customary land recognition can cause conflict and transmigration rejection. Data on land use and ownership must be available prior to land provision for migrants. Land provision conducted by the ministry is the first step for planning and design. Data mining for satellite imagery and GPS needs validity from field observation, but there were difficulties in Muna field observation because of unfinished road construction and lack of telecommunication infrastructure.

FGD in Muna is ineffective for data mining and validity. It is more about the socialization program, root discussion, approaching local people, and learning from the previous program.

6. CONCLUSION

Transmigration generates regional development in the frame of population growth and investment. Therefore, it is essential to plan the transmigration program comprehensively prior to the deployment. The impacts on nature and local people must be controlled and managed to improve the value of transmigration.

Ministerial Regulation 5 of 2021 emphasizes transmigration management for reaching out to equitable populations and

development to generate regional investment. There are various implementations of the new concept of transmigration. Transmigration has been switched from new resettlement to the 'second-stage development', which is rehabilitating the existing resettlement projects. Furthermore, transmigration in this era focuses on infrastructure development and revitalization (52) and improving living quality and environmental ethics (53). Transmigration 4.0 must be consistent with the Indonesia development planning because the planning is included in the transmigration main goals. The goals are to improve the welfare of migrants and the surrounding community, establish equitable regional development, and strengthen the nation's unity and integrity (10).

Trans Science Techno Park (TSTP) is categorized as a National Agri Science Techno Park. The synergy of transmigration and technology produces spatial planning and progressive networks in Muna. Trans Science Techno Park Mutiara implements the transpolitan concept in the transmigration developing area in Moolo Subdistrict, SKP-B. SKP-B becomes a booster for SKP-A and SKP-B in establishing connectivity of the SKPs. Pentahelix accommodates the implementation of advanced technology in agroproduction, agroindustry, agribusiness, agrotechnology, and agrotourism.

The convergence of technology and agriculture in TSTP is known as Transpolitan 4.0 and is replicable in other contexts. The agriculture sector still has an important role. The new perspective regulation mentioned that human resources with competencies are needed to increase human resource capacity to be involved in the industry, trade, and service business of transmigration 4.0.

Points of failure related to transmigration are deforestation, limitation of capability and motivation, land determination for settlement, and recognition of indigenous people (12). The solutions for these failures are also the answers to research problems.

The new transmigration scheme in the pilot project of Muna aims to establish human empowerment in ICT and suitable knowledge for migrants and local people. The ability will create advantages and benefits by implementing advanced technology in transmigration programs.

The programs also create integration of functions and connections through developing area

units on a macro and micro scale. Deforestation can be controlled by integrated spatial planning and interconnection between developing area units (SKP). The land use planning should be appropriate to the soil's natural characteristics and features of Muna. Each SKP focuses on specific functions to build a beneficial relationship. Integrated spatial planning on a microscale is the concept of TSTP in SKP B. Pentahelix stakeholders work together in TSTP Mutiara as collaborative functions to generate progressive networks. Each stakeholder manages specific spaces as its authority and roles.

The new scheme applies better approaches to local people's participation. The adaptation of migrants with the locals is an essential factor for the creation of a good transmigration developing area. In some cases, conflict could happen because the population of migrants grew faster than local communities and controlled the market and society. The study in Banyuasin and Ogan Ilir in South Sumatra Province showed that the socio-cultural conditions of migrants were low regarding the support of community leaders and group existence, although the harmony of social relations was high (36).

Transmigration programs that are concerned with environmental improvement and conservation are recommended for the goals of future research. The research develops area measurement methods for adequate land use provision. The method can control land clearing or deforestation while boosting optimum agricultural production and respecting nature conservation. Customary land tends to protect nature. Satellite imagery can be utilized effectively to establish ecological transmigration based on characteristics and area.

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