The Morphology of Urban Agriculture of Marisa District, Indonesia

by Irwan Wunarlan

Submission date: 30-Jun-2023 09:31PM (UTC+0800)
Submission ID: 2124760097
File name: CEA33-14828216.pdf (1M)
Word count: 8523
Character count: 47120

Civil Engineering and Architecture 11(1): 412-424, 2023 http://www.hrpub.org
DOI: 10.13189/cea.2023.110133

The Morphology of Urban Agriculture of Marisa District, Indonesia

Irwan Wunarlan[1,*], Sugiono Soetomo[2], Iwan Rudiarto[3]

[1]Department of Architecture, Faculty of Engineering, Universitas Negeri Gorontalo, Gorontalo, 96128, Indonesia
[2]School of Architecture and Urban Science, Universitas Diponegoro, Semarang, 50275, Indonesia
[3]Department of Urban and Regional Planning, Universitas Diponegoro, Semarang, 50275, Indonesia

Received June 27, 2022; Revised October 6, 2022; Accepted October 25, 2022

Cite This Paper in the Following Citation Styles

(a): *[1] Irwan Wunarlan, Sugiono Soetomo, Iwan Rudiarto , "The Morphology of Urban Agriculture of Marisa District, Indonesia," Civil Engineering and Architecture, Vol. 11, No. 1, pp. 412 - 424, 2023. DOI: 10.13189/cea.2023.110133.*

(b): *Irwan Wunarlan, Sugiono Soetomo, Iwan Rudiarto (2023). The Morphology of Urban Agriculture of Marisa District, Indonesia. Civil Engineering and Architecture, 11(1), 412 - 424. DOI: 10.13189/cea.2023.110133.*

Abstract Activities of most of the population in Marisa district and Paguat district generally revolve around primary agricultural production in suburban and hinterland. This research was purposed (1) to examine the causes of the urban agglomeration of farmer settlements, thus resulting in a spatial form or urban morphology; (2) to analyze the development process of city morphology due to the economic strength of the agricultural commodity export sector, specifically in hinterland farming areas; (3) to analyze the economic growth due to the export base of the agricultural commodity with an emphasis on the population of Marisa. A quantitative-qualitative method based on the post-positivism philosophy was employed. This research employed several techniques in the data collection process, such as observation, document review, and interview. In the data analysis, several stages were also performed, such as analysis of Leading Commodities (Location Quotient (LQ) Analysis; LQ_{share} & LQ_{Shift} Analysis) and Spatial Analysis. The result showed that: (1) the urban agglomeration led to the settlement of farmer communities, which also formed a mutual relationship among the residents. (2) Marisa, according to the classification of urban morphology, resembled a star-shaped or octopus layout. This result indicated that the dynamics of Marisa as a region started from the establishment process of the region, and the study suggested further research related to this matter.

Keywords Farmers, Agricultural Commodity, Agglomeration, Morphology

1. Introduction

Activities of the majority of the population in Marisa district and Paguat district in Pohuwato regency of Gorontalo province generally revolve around primary agricultural production in suburban and hinterlands, considering that agricultural activities demand extensive land or areas. For this reason, the agricultural sector dominates land use in Marisa. The primary agricultural activities were initially aimed at fulfilling the needs of the population of the city. However, there is an intense shift in economic activities, thus contributing to the surplus of agriculture products in suburban and hinterlands.

Marisa comprises several districts, namely Marisa, Randangan, and Paguat. The population of each district is 20,112 people, 16,512 people, and 15,748 people, respectively. The dynamics and mobility of the population contribute to the development and growth of Marisa's structure and spatial patterns. Infrastructures and resources of agricultural commodities are considered sufficient. Currently, the three districts mentioned previously are the areas well-known for their agricultural product exports (exportable commodities). Copra production in the Marisa and Paguat district can reach 2789.8 tons a year. In addition, these two areas also produce 45,870.7 tons of maize annually [1]. Extensive and various infrastructures in Marisa and Paguat districts indicate two processes, i.e., economic scale and urbanization economies, which are

quite significant in both areas [2].

Marisa has undergone substantial development and growth (indicated by the provision of urban facilities, regional market activities, the surplus in agricultural commodities of the hinterland area, intra-area and inter-area accessibility), making it become a newly developing area in the western part of Gorontalo province. All of this development indicates the urbanization process in the city. Access between regions is available through public road and sea transportation in the Bumbulan sub-district/village, Paguat district. This helps the mobility of people who mostly work as a farmer. As a new developing area, Marisa and Paguat district play a major role in the process of urbanization economics. High accessibility rates and adequate urban facilities contribute to the interaction between regions and thereby forming several patterns in every activity.

LQ value of the sector of plantation crops, specifically maize and other annual crops (coconut), based on the result of analysis on each agricultural sector, is > 1. This signifies that the two crops are in the base sector or exportable commodities. The production of this type of primary agricultural commodity, which also serves as exportable commodities, has seen a rise in its production and market transaction. In other words, the two crops become the prime mover for economic growth and thereby contribute positively to the GRDP of the Pohuwato regency. The following Figure 1 displays information regarding the marketing of corn and copra agricultural commodities of Marisa to other cities.

The economic activity of sectors, including agriculture and trade, as well as hotels and restaurants, contributes significantly to the pattern and urban structure, which drives the horizontal growth of the economy of Marisa. Activities in trade, hotels, and restaurants develop better in the center of Marisa, while the agricultural production and industry flourish in the suburbs due to the condition in Marisa.

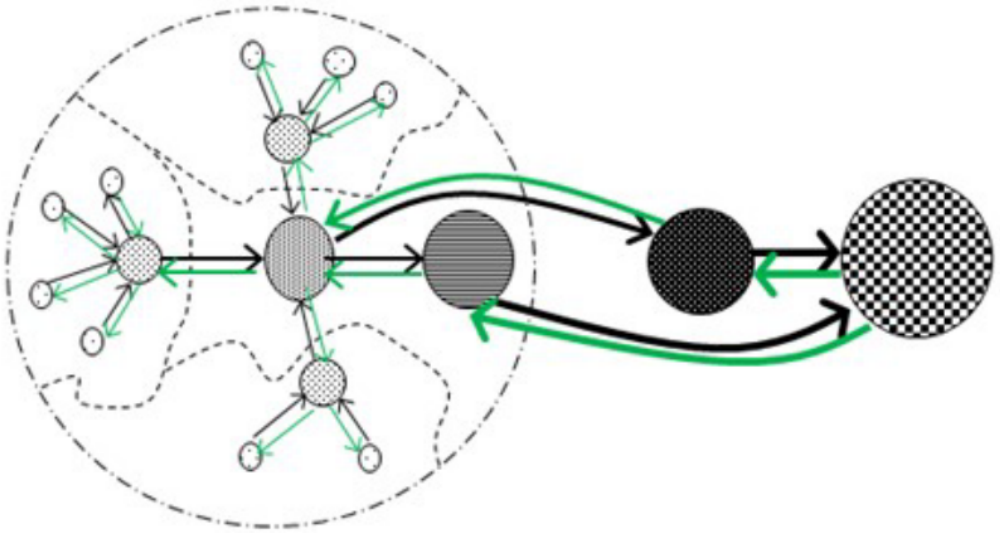


Figure 1. Marketing of corn and copra agricultural commodities in Marisa

Description:

: Farmer

: Collecting trader (village)

: Collecting trader (district)

: Collecting trader (regency/industry)

: Exporter (collecting trader, provincial level)

: External market

: commodity flow

: revenue stream (service revenue)

: region's border

The development of urban economic activities is inseparable from agriculture, urbanization, urban agglomeration in the settlement of farm laborers and landowners, variations in settlement patterns, patterns of location activities, and patterns of movement. All of these aspects form an urban pattern, and this notion is worth investigating.

From the background and the problem formulation, the research aims to address some questions regarding (1) The interaction between spatial and urban patterns of Marisa with urban economic activities, including factors caused by the export of agricultural base commodities. (2) The urban morphology development due to the farmer concentrations contributes to establishing settlement areas in Marisa, Pohuwato regency, Gorontalo.

Further, this research examines the agricultural activities and rural-urban interactions that shape urban areas' urban economic activities and development. On that ground, the objectives of the research are: (1) to examine the causes of the urban agglomeration of farmer settlements, thus resulting in a spatial form or urban morphology due to the economic development of the agricultural commodity export; (2) to examine the process of urban morphology caused by the economic strength of the agricultural sector, specifically in hinterland farming areas, and explore the economic growth due to the export base of agricultural commodities with an emphasis on the population of Marisa.

2. Literature Review

2.1. Location and Growth Pole Theory

In 1826, Johann Heinrich Von Thunen formulated a theory on the specialization of land use based on types of agricultural activities (food production, farming) within an area with a monocentric spatial structure. The theory also considers the price and distance from the production location and the city center as the market area [3]. The agricultural activity considers the distance between the production area and the city center; the notion is often referred to as land rent theory, as it involves the rate of land rent price as the measurement. The agricultural business activity in the first concentric nearby the city center is considered the business with the highest productivity per hectare. The second concentric belongs to the agricultural activities with lower productivity and better product durability compared to those in the first concentric, and so forth. That being said, the commodity is assumed to yield high enough profit to pay the land rent price [4].

Development pole theory elaborates on a city's economic development within a wide area by considering the spread of resources and unequal resource absorption. Involving economic measurement tools, the theory is regarded as dynamic; it also proposes its implication for planning. Development pole theory is able to explain the development between developed and developing countries. A center of development must possess four characteristics: 1) internal relation between activities with economic values, 2) the presence of multiplier effect, 3) geographic concentration, and 4) support towards the development of nearby area [2].

2.2. Basic and Non-basic Economy

Demands for goods, services, and products stimulate the growth of industry that utilizes local resources (manpower and material); such conditions will encourage new jobs and contribute to community welfare [5]. The export basis model is identical to the economic basis model [6]; therefore, it is assumed that economic activity is the root of export activity. Economic activity is classified into basic and non-basic sectors [7,8].

Export basis activity is an economic activity with comparative and competitive superiority within an area. The activity specializes in the production and export of goods and services with optimal cost compared to other goods and services. An export activity goes beyond administrative borders [9]; therefore, it produces income for a region [10] and influences the activities in surrounding regions [11]. A method to sort between basic sector (export) and non-basic sector (service) comprises the location quotient (LQ) technique as the quotient that compares the number of parts of a sector in a region with the whole sector in national scope [12]. The LQ share and LQ shift equations are presented as follows [13,14]. LQ (Location Quotient) share equation.

$$\text{LQshare} = \left[\frac{\frac{(QRkn+QRko)}{(QRk+QRo)}}{\frac{(QNkn+QNko)}{(QNn+QNo)}}\right] \quad (1)$$

$$\text{LQshift} = \left[\frac{\frac{(QRkn-QRko)}{QRk-QRo}}{\frac{(QNKn-QNko)}{QNn-QNo}}\right] \quad (2)$$

where:

QRko: Economic indicator of sector k of an area at the beginning of a period

QRkn: Economic indicator of sector k of an area at the end of a period

QRo: Economic indicator of the total sector of an area in the beginning of a period

QRn: Economic indicator of the total sector of an area in the end of a period

QNkn: Economic indicator of sector k of reference area at the beginning of a period

QNko: Economic indicator of sector k of reference area at the end of a period

QNn: Economic indicator of the total sector of reference area at the beginning of a period

QNo: Economic indicator of the total sector of reference area at the end of a period

The sector's relative position is determined based on

criteria as follows: (1) LQshare ≥ 1 and LQshift ≥ 1: Progressive sector, which indicates that the sector is highly contributive with a high level of specialization/ concentration and rate of change/competitiveness. (2) LQshare < 1 and LQshift ≥ 1: Developing sector, which indicated that the sector is considered as prospective to be impactful or having a low level of specialization/concentration but with a high rate of change; (3) LQshare ≥ 1 and LQshift < 1: Slow-progressing sector, which indicates that the sector's prospect is rivaled by the similar sector in other regions or having a high level of specialization/ concentration, but with a low rate of change/competitiveness. (4) LQshare< 1 and LQshift < 1: Lagging sector, in which the sector is less prospective to cause any impacts or has a low level of specialization/concentration and rate of change/competitiveness.

2.3. City and City Development

A city is defined as a surface area where a population concentration occurs. The community conducts various types of activities in economic, sociocultural, and governmental administrative sectors. In detail, a city possesses several characteristics as follows: 1) geographical land that consists mostly of settlement area; 2) population in relatively large number that is concentrated on the limited land area; 3) livelihood that comprises mostly non-agricultural activities, most of them are in tertiary/service sectors (trade, transportation, finance, banking, education, health, and other services), as well as secondary/processing sectors (industry and manufacture); 4) rational, economic, and individualistic interaction patterns that are considered attractive by people who live outside the city, either those who live in rural areas or in smaller towns. On the other hand, several characteristics of a city: taking place in a particular location within an area, developing in a group, definite regional border, availability of various types of livelihood, the requirement for resources, presence of a monumental identity, and a place that accommodates humans and buildings [15].

2.4. City Spatial Forms and Expressions

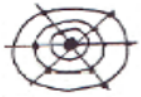
City development, as an accumulation of various events or activities and interactions of city dwellers, will shape the physical environment within a certain period, thus affecting the spatial appearance [16]. Cities are formed over a long period and are an accumulation of development stages. The study of urban morphology is very important to explain the phenomenon of a city by looking at its shape and structure in the initial conditions to the current conditions of a city's development [17].

The product of urbanization results in the physical space of the city or changes in the land use of the city, creating problems in urban planning. The development process of a city is inevitable and identical to the development of population and the economy. Housing and public infrastructure are among the essential elements in the efforts to accommodate high population and economic growth rates. That being said, the procurement process of the infrastructures tends to convert productive agricultural land, alter and fragment the earth's vegetation cover [18,19], and shift the parts of the city through the penetration of commercial functions [20]. In general, the commercial functions take place in strategic locations in the urban area and directly influence the ever-growing development of the city's spatial structure.

Urban areas have diverse spatial structures and are constantly evolving over time. Urban spatial structure refers to the structure of residential centers and infrastructure network systems and the supporting facilities for socioeconomic activities [21]. Several factors influence the diversity of urban spatial structure, namely geography, topography, history, water, land, and activities that occur therein. In addition, the physical elements of city formation are influenced by land use, building layout, circulation and parking, open space, pedestrian paths, supporting activities, information systems, and conservation and conversion [22,23].

At a macro level, the urban spatial structure in several major cities in Europe and America follows several models. The developing city will form a new urban spatial structure model as a combination or evolution of several existing models. The following table will explain the models in detail [24].

Table 1. Urban Spatial Structure of European and American Cities

No	Urban Structure Model	Visualization
1.	Star Model	
1a.	Large Radial	
1b.	Polycentric	
		Development direction
2.	Concentric Radio Model (spider web with variable radial and sturdy tangential connections)	
2a.	Weak concentric connections	 
		Effective soil control
2b.	Weak concentric connections	
3.	Discontinuous polycentric	
3a.	Weak peripheral polarity (Rennes, Pekin 1992)	
3b.	Strong peripheral polarity (London, Moscow, and Stuttgart)	
4.	Linear (more or less polycentric)	
4a.	Corridors (Cairo and Seattle)	
4b.	Dual Axis with SDRIF new city (Paris)	
		Development direction
		Effective soil control
4c.	Circular (San Francisco urban area, Randstad-Dutch)	
5.	Polycentric reticular	
5a.	In more or less dense urban layers (Detroit, Los Angeles)	
5b.	Galaxies with a strong urban core (Ruhr, Rhine-Neckar)	

The development of a city can be seen from the pattern of development of the city's spatial structure and the factors that influence it. Moreover, the pattern of development of the urban spatial structure is influenced by population growth, the process of urbanization, and technological advances that serve urban communities [25]. The physical propagation pattern of the city is divided into three forms, namely: (1) the physical propagation of the city as a form of concentric development, (2) the physical propagation of the city that follows the pattern of the road network and the propagation is not the same in every part of the city with elongated linear physical development (ribbon/linear/axial development), (3) the physical propagation of a city that does not follow a certain pattern is called leapfrog/checkerboard development [26].

2.5. Land Management

Land management aims to point out the spatial division of the city's role [27]. Allocation of land for economic activity requires considering the natural features (e.g., land shape, surface water, groundwater, seawater, soil, mineral contents, and vegetation) and population activity. Aside from settlement, regional, rural, or urban land management is hugely influenced by socio-economical activities. Among methods to identify urban land use patterns are concentric zone theory, sector theory, and multiple nuclei concept.

2.6. Development Theory3

Regarding the notion of development, in general, there is an agreement that development is a process for making changes [28]. Meanwhile, a simpler understanding explains that development refers to a change process for the better through planned efforts [29].

Development is a process of change that includes all social systems, such as politics, economy, infrastructure, defense, education and technology, institutions, and culture [30]. Furthermore, development is an economic, social, and cultural transformation [31]. Development is a planned change process to improve various aspects of people's lives. In addition, national development can also be interpreted as a deliberate economic, social, and cultural transformation through policies and strategies toward the desired direction [32]. The transformation in the economic structure, for example, can be seen through the increase or rapid growth of production in the industrial and service sectors so that its contribution to national income is getting bigger. On the other hand, the agricultural sector's contribution will become smaller and inversely proportional to the growth of industrialization and economic modernization. With the increasing complexity of people's lives involving various aspects, the idea of modernization no longer only covers the economic and industrial fields but has penetrated into all aspects that can affect people's lives. Therefore, modernization is defined as a process of transformation and change in society, including all aspects, i.e., economic, industrial, social, cultural, and so on [33].

From the history of changes in conceptualizing development, there are various ways of defining development. At first, development was only defined in an economic sense, but the thought developed that development was not only defined in an economic sense, but development was seen as a dynamic and multidimensional concept or covered all aspects of human life, such as; economic, political, sociocultural, and so on [33].

3. Methodology

This research employed a quantitative method and explained it qualitatively. The use of quantitative method was based on the positivism theory, while the qualitative method was based on the philosophy of post-positivism or interpretive; it was used to examine the condition of natural objects. The data analysis was performed inductively, thus ensuring more meaningful research results than research generalization. The qualitative data were collected using purposive sampling. In a purposive sample, the sample size is determined by considering all information that will be collected [34]. In this section, the study was carried out starting from the conduct of the field study and during the study (emergent sampling design).

The qualitative data collection process employed several techniques, such as observation, document review, and interview. Additionally, the survey and observation methods were applied to uncover the phase of urban development and changes in the spatial structure of Marisa from 1980 to 2017.

This research focused on Marisa, a center of services and trade, hotels and restaurants, and education. Moreover, having a role as the second food barn after the Randangan district, the Paguat district functions to support its activities of Marisa (see Figure 2). Marisa and three sub-districts/villages in the Paguat district (as the hinterlands) were chosen to be the research sites for the following reasons. (1) The area is a small and remote city (enclave city); Marisa is located on the coast of Tomini Bay and in the western part of Gorontalo province. (2) The area is an expansion of the Boalemo district. Marisa has the potential for changes in land use and the city's socioeconomic development.

In the data source sampling techniques, purposive sampling was performed through interviews. The unit of analysis was carried out in Marisa consisting of sub-districts/villages of Buhu Jaya, Libuo, Maleo, Lotus, Palopo, Bulangita, Botubilotahu Indah, North Marisa, South Marisa, Pohuwato and East Pohuwato. Interviews were conducted with the Marisa and Paguat district residents as the research sites. The respondents should be considered key persons who were deemed worthy and understood the growth and development of Marisa.

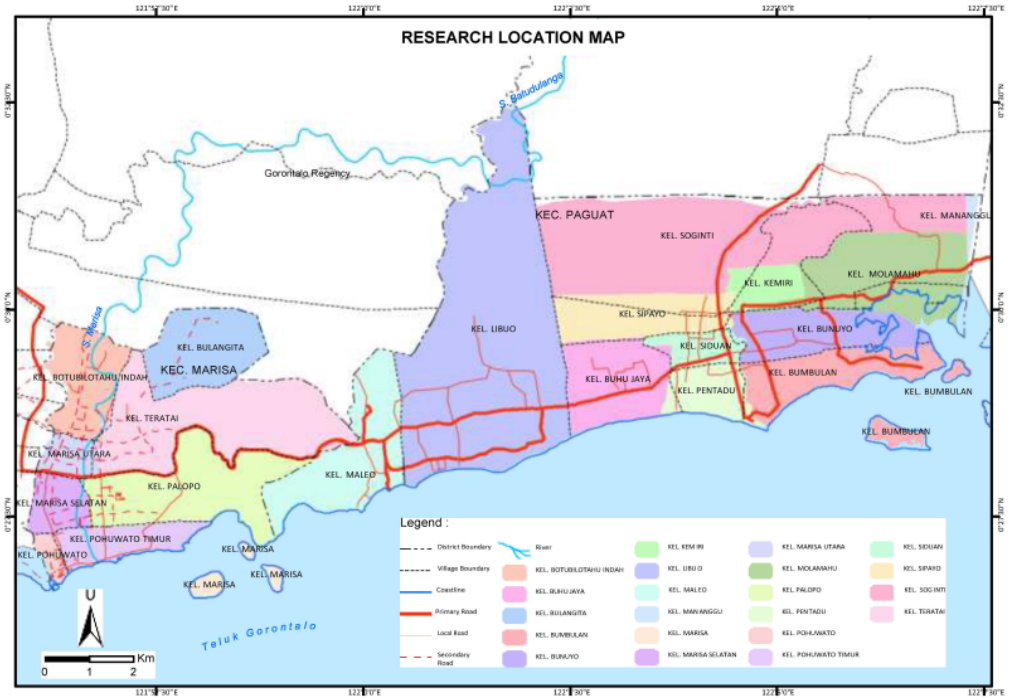


Figure 2. Research Site at Marisa, Pohuwato Regency

The data collection techniques relied on the triangulation method, which combined various data collection techniques and data sources. The implementation of triangulation in this section was not merely to collect the data but also to test the credibility of the data. The purpose of triangulation was not to find the truth about some phenomena but to broaden the researchers' understanding of what had been found.

Quantitative data analysis was conducted deductively; meanwhile, qualitative data analysis was performed inductively, meaning that the analysis was based on the data obtained. Some stages of the analytical method used in this study include:

Analysis of Leading Commodities

The leading commodities used in this study consisted of (a) Location Quotient (LQ): analysis is one of the indirect measurement methods. This method is used to determine whether a sector in an area is a base or non-base sector [9]. *(b)* LQ_{share} and LQ_{Shift} Analysis, in which the result can be used for applying the priority scale of developmental sectors [13].

Spatial Analysis

This approach takes into account the changes in the elements that make up urban space quantitatively and qualitatively [35]. To find out the development of Marisa and its development trends, each map analysis was carried out overlaid at any given time. Besides, analysis of spatial patterns (concentration, distribution, spatial complexity, etc.), spatial tendencies, forms, and all spatial interactions were presented descriptively [14].

4. Result and Discussion

4.1. Analysis of the Economic Condition in Marisa

The result of the LQ analysis in Table 1 reports that the superior commodities that move the market are copra (LQ= 1.86, contributing to the GRDP of the regency by 14.77% in 2017) and maize crops from the agricultural sector (LQ= 2.05, contributing to the GRDP of the regency by 16.28% in 2017). Both are classified as exportable commodities that drive urban economics with multiplier effects of 0.63. Maize markets have the highest performance and competitiveness, which give a contribution to stimulating the economic conditions in a city or a region.

The production rate of copra over the last few years was 59.56 tons (2010) and 67.80 tons (2017). On the contrary, maize crops outnumber the production rate of copra commodities (11,019 tons in 2010 and 19,119.33 in 2017). Supplies of copra and maize crops also come from the Paguat district.

Table 2. Gross regional domestic product of Marisa based on constant Price 1980-2017

No	Sector	Year		
		1980	2000	2017
1	Agriculture, Plantation, Forestry, and Fisheries			
	Agriculture			
	Maize	3701.29	6761.59	19422.24
	Rice	115.56	770.43	1893.02
	Palawija	13.78	34.50	63.10
	Plantation	4911.51	6242.99	12305.44
	Animal husbandry	421.97	541.19	693.92
	Forestry	479.04	381.02	108.20
	Fisheries	1871.76	3247.25	5708.23
2	Mining and quarrying	1388.35	1325.34	221.85
3	Processing industry	630.28	1229.31	3242.11
4	Electricity, gas, and clean water	23.57	74.49	250.87
5	Construction	596.64	1106.61	3367.92
6	Trade, hotels, and restaurants	392.10	4830.47	9880.79
7	Transportation, warehousing, and communication	320.26	521.86	1431.94
8	Finance, real estate, leasing, and services	23.18	241.01	1156.41
9	Community, social and personal services	19.06	2783.84	4092.54
	Sum Total of GRDP	14908.34	30091.88	63838.60
	Growth Rate of GRDP		6.79	7.48

In Paguat, the copra commodities are processed to CPO and traditional cooking oil. The production of the commodity is under the management of PT. Multi Nabati Sulawesi. Other companies, including PT. Seger Pangan Sejahtera and PT. Mellium Agroindo Selebes, process the coconut to desiccated coconut and *nata de coco,* respectively. Crude palm oils (CPO in short) from copra extracts, excluding traditional cooking oils, are exported to other areas. The traditional oils are mostly distributed to Marisa and other districts in the Pohuwato regency local markets. Areas included within the export target of copra involve India (international market), Manado, Makassar, and Surabaya. Similar to the copra commodity, processed maize is exported by PT. Harim and PT. Seger Pangan Sejahtera to meet the market demand in the Philippines and South Korea for the international market and Makassar and Surabaya for the local market.

Back in 2010, the export value of copra commodities in Marisa reached IDR 1.357 billion. The export value of this commodity increased to IDR 1.458 in 2017, although it was not that significant. In contrast, there was a spike in the export value of maize commodities from IDR 97.049 billion in 2010 to 296.462 in 2017. Reinvestment of the export revenue from the regional and international markets by the government and the people has been attempted by purchasing import essentials, ranging from food, clothing, and shelter needs, as well as various service products that are not produced in Marisa. This approach supports and provides services for basic economic and non-basic economic activities (domestic) in the area.

4.2. Economic Analysis of Marisa

According to the GRDP of Pohuwato Regency, the agricultural sector (with its commodities, namely maize crop and copra) and capture fisheries still dominate economic activities in Marisa. The agriculture and capture fisheries subsectors serve as the basic sector of the economic conditions of Marisa, while others are categorized as non-basic industries or supporting industries.

All of the agricultural products, including those from fisheries, are distributed to other cities and even outside the Pohuwato regency or the external market. Regional and international trade has become the source of income for the people and government. The government has opted for the

reinvestment of income in the basic and non-basic sectors. The government has endeavored to provide public infrastructures to optimize the reinvestment further. For the urban community, the regional and international market income will be invested in both primary and non-basic sectors. People also spend their income on essential goods, housing, clothing, health, education, and saving. These activities stimulate the urban economy of Marisa.

Stronger economic activities are reported in the agricultural sectors of Marisa. From 2010 to 2017, processing industries in the Paguat district have seen a rise in their economic activities. This is represented by the growth of urban solids from 13 ha in 2010 to 20.44 Ha in 2017. The same trend also applies to Marisa's real estate development, with the urban solids' growth from 12.36 ha in 2010 to 22.21 ha in 2017.

The loss of agricultural land in Marisa by 287.60 ha has been spotted as the development of agricultural areas has undergone significant development. Despite being one of the small cities of Pohuwato regency, Marisa is the most populous area in the regency. According to the statistics bureau of Pohuwato regency, the total population of Marisa was 22,887 in 2018, with a population density of 382.34 people/ha. A statistic report has revealed that from 1980 to 2017, the agricultural land area had dropped to 1450.53 ha, indicating land conversion in the city, which was impactful on many agricultural lands, e.g., primary dryland forests and mangrove forests.

In 1980, 36.77% (2201.23 ha) of the total area of Marisa was mostly plantation; it was the highest land-use rate for agricultural sectors. Following the list was the use of land for primary dryland (1754.01 ha, 29.30%), shrub (864.71 ha, 14.44%), mangrove forest (402.09 ha, 6.72%), open spaces (392.75 ha, 6.56%). Other land uses included dryland farming (168.14 ha), settlement areas (122.11 ha), and inland water (75.88 ha). The trend of land use remained the same in the following years. The only notable differences were a decline in the area of inland water to 58.15 ha and primary mangrove forest to 197.65 ha, while the area of moorland was increased to 119.73 ha.

Dryland farming dominated the land use in 2017, with a total area of 1580.43 ha or 26.40%. Following the dryland farming was the use of land for plantation (1450.53 Ha, 24.23%), shrub (850.28 ha, 14.20%), primary dryland forest (845.12 ha, 14.12%), residential area (640.65 a, 10.70%), and primary mangrove forest, pond and inland water area (2 to 5%).

The development of the settlement area saw a rising trend in the early 1980s, with a total area of 122.11 ha. In the next ten years, the total area used for settlement was increased to 141.55 ha, 240.56 ha, 284.69 ha, and 640.65 ha. This was likely due to the land conversion of productive agricultural land and mangrove forest, which led to conflicts revolving around the need for food and settlement, along with other facilities. Recently, many agricultural lands have been used for growing crops, such as coconut, maize, and other horticulture plants. Several factors determine the conversion of coconut and maize plantations. Among the examples are economic factors, social factors, and government roles.

4.3. Social and Population Analysis of Marisa

Population in economic development has a dual role when viewed from the economic side, namely as a demand and a supply. In line with these dual roles, the population can be a driving factor, and an obstacle to economic development as residents or humans who inhabit an area or city will be the subject and object of development in the region or city concerned [20]. Improving the quality of the population can be done through improving the quality of education, health, income, and social facilities [36]. Further, a large population positively and negatively impacts economic growth. A high-quality population can provide quality labor as production inputs and open market opportunities to encourage economic growth in aggregate [37]. However, a large population with low quality will be difficult to compete in the labor market, resulting in unemployment which has an impact on socioeconomic, food insecurity, and the environment.

Marisa area has a population growth rate of 1.76 per year. The village or urban village with the highest density level is North Marisa-Marisa District, with a population density of 3,833 people/km2, while the lowest density is Libuo-Paguat District, with 68 people/km2.

This livelihood composition is reflected in the gross regional domestic product at constant prices and the economic structure of Pohuwato Regency, where the agricultural sector has a high contribution of 43.07% [38]. The quality of the population in the urban area of Marisa can be viewed from the human development index. On average, the Pohuwato Regency has a good HDI or moderate category with 63.17.

Marisa has two regional variations: the south coast and an agrarian area in the north. These regional variations affect the socioeconomic and cultural conditions of the people living in the two regions. The socioeconomic and cultural characteristics of the population living in coastal areas generally work as fishermen with low economic levels, minimal infrastructure, and poor sanitation. The orientation of fishermen's settlements generally faces the coast because the population's activities are water-based, and the settlement pattern follows the pattern of the coastline and low-quality house-building materials. Residential settlements in coastal areas have multifunctions where settlements are used not only as a place to live and socialize but also as a place for processing various fishery products such as drying the caught fish. The marketing area for fishermen's catches is intended to meet the needs of residents in the Marisa area.

Meanwhile, for people who live in inland areas or agricultural areas, the socioeconomic and cultural life of

the population is very varied. Generally, the population works as farmers with a slightly better economic life than residents living in coastal areas. Residential areas are equipped with infrastructure and sanitation, and the quality of housing materials is slightly better than the conditions of settlements in coastal areas. The pattern of population settlements in land or agrarian areas forms a pattern of spreading and clumping (groups). Like settlements in coastal areas, settlements in this area also have multiple functions. This means that settlements also function as a place to accommodate crops and process and distribute agricultural commodities, in addition to settlements which have the main function as a place to live and socialize. Many houses or settlements located close to transportation routes, especially land transportation, have been converted into service places, restaurants, cafes, or restaurants or hotels.

4.3. Soil Geophysical Analysis of Marisa

There was not much residential area in both the city center and suburban in 2017. At the time, the settlement area was only 10.70% of the total area of Marisa (640.65 ha). Most of the land was used as dry farm areas (26.40%, 1580.43 ha) and plantations (24.23%, 1450.53 ha), shrubs (850.28 ha, 14.20%), and primary dryland forest (845.12 ha, 14.12%). Increased land use for the development of the settlement area, although not that significant, has continued slowly. Take a look at the comparison between the total settlement area in 1980 and 2017. The settlement area took only 122.11 ha out of the total land area in the past. In 2017, the number increased significantly to 640.65 ha. This situation is closely related to the emergence of trade in goods and services, which is seen from the percentage of the land use for trade centers at the city center of Marisa of 0.07% (4.15 ha) of the total area. In other words, the comparison among the three sectors, i.e., settlement area, trade centers, and agricultural land, is 1:0.006:5. This trend indicates that the agricultural sectors were the prominent sector in Marisa, a unique city with the characteristics of urban and rural areas. Such a trait, i.e., the composition of the land use, portrays the uniqueness of an agricultural city [26].

There are two categories of land use in Marisa: urban solids and urban voids. Urban solids in the city center were 11.06% of the total area in Marisa or 662.23 ha, while the voids dominated the area in Marisa with 5323.86 ha (88.94%), the ratio between the two areas was 1:8. Simply put, the majority of the area in Marisa was void areas, with many agricultural lands.

The pattern of urban solids and urban voids is mostly found in sub-districts/villages of Bulangita, Teratai, Maleo, Libuo, and Buhu Jaya. All five villages or sub-districts are far from the city center of Marisa. The densest land use can be found in sub-districts/villages of Pohuwato, PohuwatoTimur, Marisa Selatan, and Marisa Utara, which are located nearby the downtown. In other words, the sub-districts/villages of Bulangita, Teratai, Maleo, Libuo, and Buhu Jaya are the only agricultural centers within the area of Marisa.

The situation above is portrayed by the dimension of several roads in Marisa, such as Jl. Trans Sulawesi (a 14-meter primary road that passes Buhu Jaya, Libuo, Maleo, Teratai, Palopo, Marisa Selatan, and all the way to Marisa Utara), Jl. Sultan Amai (an 8-meter collector road that passes Marisa Utara and Botubilotahu), Jl. Pelabuhan (an 8-meter collector road that passes Marisa Selatan, Pohuwato Timur, and Pohuwato). There are also other 12-meter collector roads, e.g., Jl. Diponegoro, Jl. Nani Wartabone, and Jl. Jenderal Sudirman, and the remaining Jl. Dr.Herizal Umar, an 8-meter road that passes sub-districts/villages of Botubilotahu Indah and Teratai. The dimension of each road in every village represents the functions based on the level of road's capacity.

The road network dimension refers to the basic form of the network structure and has functioned as the input of the road network. Jl. Trans Sulawesi, the primary road in Marisa, has branch roads in several sub-districts/villages. Those involve Jl. Teratai-Sipatana (Teratai village), Jl. Palopo Raya-Diponegoro and Jl. Jenderal Sudirman (Palopo village), Jl. Sultan Amai (Marisa Utara village), and Jl. Pelabuhan (Marisa Selatan village). The road network runs through Marisa with its linear city model. To the north, the arterial road intersects with collector roads, i.e., Jl. Sultan Amai, while in the southern part of the arterial road intersects with Jl. Pelabuhan, thus forming crossroads. Such a condition indicates a strong interaction between the city center and suburb in Marisa. Jl. Trans Sulawesi is the main road that spreads across the downtown area of Marisa. The road supports the economic activities of people in the city and allows those from other branch roads, i.e., Jl. Sultan Amai and Jl. Pelabuhan to go to the settlement area.

4.4. Pattern and Functions of Built Environment

The built environment, especially houses in the settlement area, has several characteristics. On average, the height of houses ranges from 4 to 4.5-meter with the minimum distance range of 1 to 20 meters (this does not apply to the settlement area in Pohuwato and Pohuwato Timur village, with the minimum distance of 1 to 2 meter). The average building coverage ratio is 63/55, with varied physical appearances and configurations.

The built environment creates blocks and open spaces. Furthermore, the development of the building, including the adjustment of the size, depends on the building's owner. The material of the building is built separated from one part to another. All primary built environments, e.g., settlement, hotel, bank, grocery, pharmacy, health center, government office, and hospital, are built on both sides of the main road, or JL. Trans Sulawesi. The central business district (CBD),

located in the downtown area, follows the elongated shape of the city. Most of the building in this area is originally from the built environment of a settlement area with its functions conversed [20]. The buildings are common throughout Jl. Trans Sulawesi. Government offices are built on a separate block in Palopo village, which turns out to be the new city center in Marisa. This is to ease the cooperation between government bodies. The majority of the buildings are single-story, except the regent office, immigration office, religious court office, and military HQ 1313, which are all two-story.

4.5. Urban Morphology of Marisa (Form Analysis)

The land use, road network, and the function and pattern of the built environment are the urban morphology components of Marisa. These components have their own functions in shaping urban morphology. Each composition describes the formation of urban morphology. Moreover, the compositions form a compact, octopus or star-shaped city. This urban form has its unique characteristics, where the development of downtown and other buildings follows the road network.

In the downtown area of Marisa, the central business districts are located on the main road, Jl. Trans Sulawesi, with the percentage of building density at 22.14%. The city center has undergone a steady development, which is represented by the fact that the urban solids follow the model of the branch roads. On the branch roads, the density percentage, measuring at 12.35%, is lower than those of the city center or main road.

The implementation of the octopus-shaped morphology in the central business district and settlement area in Marisa consists of three parts: core, body, and framework. Within the core area are many buildings for business centers for commercial and market activities, with high building density. Supplies of essential needs of the urban population are managed in this area. The downtown of Marisa is located on both sides of Jl. Trans Sulawesi, Jl. Pelabuhan, and Jl. Sultan Amai; it covers the area of Marisa Selatan and Marisa Utara village. The basic structure of Marisa is the base of the octopus-shaped city, which is formed by the road network. The base form of an octopus-shaped or star-shaped city is a branch road (spinal). In this type of framework, road network access is available from any direction. This concept indicates the connectivity between the downtown area and suburban area of Marisa, thus resulting in urban morphology development. The framework of the urban morphology of Marisa refers to the collector road and branch roads, with minimum functions of a road network. The third part of the star-shaped morphology, and at the same time, the development of the previous part is identical to urban solids in the surroundings, which later follow the branch road networks. Further, the lower part of urban solids represents a built environment comprising agricultural land (with coconut and maize plantations in the northern part, and aquaculture centers in the southern part).

5. Conclusions

The dynamics of Marisa as a region has started from the establishment process of the region. Therefore, the study draws several conclusions regarding the spatial pattern and structure of Marisa:

Agglomeration of farmers' settlements and housing was formed due to the agricultural activity that occurred in Marisa. The agricultural activity involved maize farming and coconut farming. The farm workers processed the coconut by drying it into copra. The whole activity was conducted within the area of maize and copra coconut farming sites as well as nearby the houses of farm workers and landlords. The area has functioned as a makeshift processing site for agricultural commodities. The farm workers' and sharecroppers' houses that did not have enough land were built nearby the farm site, while some farm workers built settlements nearby the house of a landlord who has large land area. Landowners with the large land area were able to build drying basins or *porono* nearby their houses. The landowner who built a *porono* could either use it on his/her own or rent it to other farmers who did not have such a tool. In the meantime, the farm workers settled near the drying basin to get closer to the workplace. Generally, the farm workers, small land owners, and large land owners had a family relationship; therefore, they developed strong solidarity or *ngala'a* among them.

The leading commodities that drive the city's economy are coconut plantations (copra) and food crop plantations, namely corn, where LQ copra = 1.86, with a contribution to the Regency's GRDP of 14.77% (2017). The LQ of corn = 2.05, with a contribution to the Regency's GRDP of 16.28% (2017). The two types of commodities are classified as exportable commodities that move the city or region's economy with a multiplier effect of 0.63.

There has been a change in types of land use in Marisa during 1980-2017; land based on agriculture, primary dryland forest, shrubs, and primary mangrove forest, or mangrove forest shows the land change. In 1980, the highest land use was a plantation, with an area of 2,201.23 ha or 36.77%. In 2017, the largest land use in a row was seasonal dry land agriculture of 1580.43 ha or 26.40%, plantations with land use of 1450.53 ha or 24.23%, shrubs of 850.28 ha or 14 .20%, primary dry land forest of 845.12 ha or 14.12%, housing with land use of 640.65 ha or 10.70% followed by land use of primary mangrove forest, ponds and water bodies with a percentage of 2-5 % of the total area of Marisa City. Housing and settlement land in the early 1980s had a land-use area of 122.11 ha and, in the following ten years, showed an increase in succession to 141.55 ha, 240.56 ha, 284.60 ha, and 640.65 ha. This increase was allegedly due to the conversion of productive

agricultural land and primary mangrove forests into housing and urban settlements.

Marisa has two regional variations, namely the coast in the south and an agrarian area in the north. The socioeconomic and cultural characteristics of the population living in coastal areas generally work as fishermen with low economic levels, minimal infrastructure, poor sanitation, and low-quality housing materials. On the other hand, for people who live in inland areas or agricultural areas, the socioeconomic and cultural life of the population is very varied. Generally, the population work as farmers with a slightly better economic life than residents living in coastal areas. The pattern of population settlements in land or agrarian areas forms a pattern of spreading and clumping (groups) with multi-functionality. This means that settlements also function as a place to accommodate crops and process and distribute agricultural commodities, in addition to settlements which have the main function as a place to live and socialize.

Marisa is a peri-urban city by nature [26], which undergoes natural growth due to the surplus in agricultural commodities, including maize and coconut plantations [20]. Land conversion results in changes in the urban morphology of Marisa, including the density, road pattern, vegetation region, pattern of blocks, and open space [20]. This leads to the development of settlement areas, shops, offices, workshops, hospitals, hotels, and banking. The land use, road network, and the function and pattern of the built environment are the urban morphology components of Marisa. These components have their own functions in shaping urban morphology. Furthermore, the compositions form a compact, octopus or star-shaped city.

REFERENCES

[1] Hasanuddin, H., Basri, A, "Gorontalo: Dalam dinamika sejarah masa kolonial," [Gorontalo: In the dynamics of colonial history], Penerbit Ombak, 2012.

[2] Pontoh, N.K., Kustiawan, I., "Pengantar perencanaan perkotaan," [Introduction to Urban Planning], ITB Press, 2009.

[3] Adisasmita, H. R., "Fungsi utama kota-kota besar," [The main function of big cities] in Teori Pertumbuhan Kota [Urban Growth Theories], Graha Ilmu. 2015.

[4] Sjafrizal, "Ekonomi wilayah dan perkotaan," [Regional and Urban Economics], Raja Grafindo Persada, 2012.

[5] Setiono, D. N. S., "Ekonomi pengembangan wilayah: Teori dan analisis," [Regional economic development: Theories and analysis]. Fakultas Ekonomi, Universitas Indonesia, 2011

[6] Sjafrizal, "Ekonomi regional: Teori dan aplikasi," [Regional Economy: Theories and Application], Baduose Media, 2008.

[7] McCann, P., "Urban and regional economics," Oxford University Press, 2004.

[8] Tarigan, R., "Ekonomi regional: Teori dan aplikasi [Regional economy: Theories and application], Bumi Aksara, 2007.

[9] Muta'ali, L., "Teknik analisis regional untuk perencanaan wilayah, tata ruang dan lingkungan," [Regional Analysis Techniques for Regional, Spatial and Environmental Planning], Badan Penerbit Fakultas Geografi (BPFG) UGM, 2015.

[10] Jhingan, M. L., "Ekonomi pembangunan dan perencanaan," [Economic Development and Planning], Raja Grafindo Persada, 2016.

[11] Ariffin, A.S., "Some aspects of regional growth and development theories," Journal of Humanities and Social Sciences, vol. 11, no. 1, pp. 1-15, 1997.

[12] Nurzaman, S. S., "Perencanaan wilayah dalam konteks Indonesia," [Spatial Planning in the Context of Indonesia], ITB Press, 2012.

[13] Harun, U. R., Canon, S., "Analisis Lqshift Lqshare untuk mengukur dampak perluasan kota terhadap kinerja ekonomi regional (Studi kasus: Perluasan Kota Manado terhadap perekonomian wilayah Sulawesi Utara)," [Analysis of Lqshift LQshare to measure the impact of urban expansion on regional economic performance (Case study: Expansion of Manado City on the economy of the North Sulawesi region)], Jurnal Perencanaan Wilayah dan Kota, vol. 7, pp. 21-40, 2006.

[14] Rustiadi, E., Saefulhakim, S., Panuju, D. R., "Perencanaan dan pengembangan wilayah," [Regional Planning and Development], Yayasan Obor Indonesia, 2009.

[15] Kostof, S., Tobias, R., "The city shape: Urban patterns and meanings through history," Bulfinch Press, 2012.

[16] Gospodini, A., "Urban design, urban space morphology, urban tourism: An emerging new paradigm concerning their relationship, European Planning Studies, vol.9, no.7, pp. 925-934, 2001.

[17] Zaidulfar, A. E., "Morfologi kota Padang," [Padang city morphology], Universitas Gadjah Mada. 2002.

[18] Wu, J., "Land use changes: Economic, social, and environmental impacts," Choices, vol. 23, no. 4, pp.6-10, 2008.

[19] Rudiarto, I., "Corruption on land use planning and land registration-cadaster process: an analysis of causes and consequences," LAP Lambert Academic Publishing, 2010.

[20] Soetomo, S., "Urbanisasi dan morfologi: Proses perkembangan peradaban dan wadah ruang fisiknya menuju ruang kehidupan yang manusiawi," [Urbanization and morphology: The process of the development of civilization and its physical space towards humanized environment], Graha Ilmu, 2009.

[21] Saputra, E., Widyasmara, C., "The effect of urban spatial structure on rapid bus transit services in Yogyakarta and Surakarta, Indonesia: A comparative study of the Trans Jogja and the Batik Solo Trans," Geografia Online Malaysian Journal of Society and Space, vol. 10, no., pp. 46 – 58, 2014.

[22] Kusumawanto, A., “Pengendalian arsitektural terhadap kondisi kenyamanan termal ruang luar di kawasan urban (Studi kasus koridor kawasan Malioboro, Yogyakarta),” [Architectural control of the thermal comfort condition of outdoor spaces in urban areas (Case study of corridors in Malioboro area, Yogyakarta)], ITB, 2005.

[23] Lee, A. S., "An Urban design strategy for the main street study area, Worcester, Massachusetts," University of Rhode Island, 1997.

[24] Allain, R., “Morphologie urbaine.,” Armand Colin, 2004.

[25] Budianto, H. T., “Dimensi keruangan kota: Urbanisasi dalam interaksi keruangan Kota Jakarta,” [The spatial dimension of the city: Urbanization in the spatial interaction of the City of Jakarta], UI Press, 2001.

[26] Yunus, H. S., "Dinamika wilayah peri-urban: Determinan masa depan kota," [The dynamics of peri-urban area: Determinant of the future of urban areas], Pustaka Pelajar, 2008.

[27] Jayadinata, J. T., “Tata gunatanah dalam perencanaan pedesaan, perkotaan dan wilayah,” [Land use in rural, urban and regional planning], Penerbit ITB, 1999.

[28] Riyadi, R., Deddy S. B., “Perencanaan pembangunan daerah,“ [Regional development planning], PT Gramedia Pustaka Utama, 2005.

[29] Kartasasmita, G., “Pembangunan untuk rakyat: Memadukan pertumbuhan dan pemerataan,” [Development for the people: Combining growth and equity], Cides, 1994.

[30] Alexander, A., “Perencanaan daerah partisipatif,” [Participatory regional planning], Pusat Jogja Mandiri, 1994.

[31] Portes, A., "On the sociology of national development: Theories and issues," American Journal of Sociology, vol. 82, no.1, pp. 55-85, 1976.

[32] Tikson. D.T, “Indikator-indikator pembangunan ekonomi,” [Economic development indicators], Badan Penerbit Universitas Diponegoro, 2005.

[33] Digdowiseiso, K., “Teori pembangunan,” [Development theory], Lembaga Penerbitan Universitas Nasional, 2019.

[34] Setiyawami, S., “Metode penelitian manajemen: Pendekatan kualitatif, kuantitatif, kombinasi (mixed methods), penelitian tindakan (action research) dan penelitian evaluasi,” [Methodology of research on management: Qualitative, quantitative, mixed methods, action research and evaluative research], Alfabeta, 2014.

[35] Yunus, H. S., “Megapolitan: Konsep, problematika dan prospek,” [Megapolitan: Concepts, problems, and prospects], Pustaka Pelajar, 2010.

[36] Soleh, A., Anitasari, M., “Peluang dan tantangan pertumbuhan penduduk daerah dalam pembangunan ekonomi nasional,” [Opportunities and challenges for regional population growth in national economic development], The 5Th International Conference on Local Government, Palembang, Indonesia, 2014.

[37] Supartoyo, Y. H., Tatuh, J., Sendouw, H. E. R., "The economic growth and the regional characteristics: The case of Indonesia," Buletin Ekonomi Moneter dan Perbankan, vol. 16, no.1, pp. 3-18, 2013. DOI: 10.21098/bemp.v16i1.435

[38] BPS., “Kecamatan Marisa dalam angka,” [Marisa District in numbers], BPS Kab. Pohuwato, 2019.

The Morphology of Urban Agriculture of Marisa District, Indonesia

ORIGINALITY REPORT

9%	7%	5%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Abdillah Abdillah, Ida Widianingsih, Rd Ahmad Buchari, Heru Nurasa. "Implications of urban farming on urban resilience in Indonesia: Systematic literature review and research identification", Cogent Food & Agriculture, 2023 Publication	1%
2	www.hrpub.org Internet Source	1%
3	sciendo.com Internet Source	1%
4	www.researchgate.net Internet Source	1%
5	Submitted to Universitas Airlangga Student Paper	1%
6	E S Soegoto, S T Margana. "Maintaining and Developing the Creative Knit Industry in Binong Jati", IOP Conference Series: Materials Science and Engineering, 2018 Publication	<1%

7	Submitted to Ritsumeikan University Student Paper	<1 %
8	ftp-mhf.desy.de Internet Source	<1 %
9	www.columbia.akadns.net Internet Source	<1 %
10	repository.ub.ac.id Internet Source	<1 %
11	www.astesj.com Internet Source	<1 %
12	abd88079-bdc5-4274-9638-f3715aab13b0.filesusr.com Internet Source	<1 %
13	docplayer.info Internet Source	<1 %
14	Submitted to Universitas Mataram Student Paper	<1 %
15	ejurnal.politeknikpratama.ac.id Internet Source	<1 %
16	www.iiste.org Internet Source	<1 %
17	Submitted to President University Student Paper	<1 %
	journalarticle.ukm.my	

18	Internet Source	<1%
19	digitalcommons.uri.edu Internet Source	<1%
20	Aonghas St. Hilaire. "National Development and the Language Planning Challenge in St Lucia, West Indies", Journal of Multilingual and Multicultural Development, 2007 Publication	<1%
21	Rizqi Putri Nourma Budiarti, Nur Fauziah, Zahrotul Jannah, Tri Nadia Ningsih. "LEGIT BOLTAS (Learning Gadget Bola Tata Surya) Based on Augmented Reality in SDI Raden Patah Surabaya", Kresna Social Science and Humanities Research, 2021 Publication	<1%
22	Tita Thalia Nurcahyani, Djaka Marwasta. "Peri-Urbanization in DIY and Its Relationship to Sustainable Agricultural Lands Protection Program", E3S Web of Conferences, 2021 Publication	<1%
23	ijcrr.info Internet Source	<1%
24	Bambang Setioko, Deasy Olivia, Edward E. Pandelaki, Titien Woro Murtini. "The utilization characteristics of social facilities in the border area of Semarang city", AIP Publishing, 2017	<1%

	Publication	
25	D B Zahrosa, Soetriono, D Soejono, A D Maharani, Y Baihaqi, Amam. "Region and forecasting of banana commodity in seroja agropolitan area lumajang", Journal of Physics: Conference Series, 2020 Publication	<1 %
26	dspace.unimap.edu.my Internet Source	<1 %
27	e-journal.unair.ac.id Internet Source	<1 %
28	mafiadoc.com Internet Source	<1 %
29	v2.publishing-widyagama.ac.id Internet Source	<1 %
30	www.mdpi.com Internet Source	<1 %
31	D L Cahya, E Martini, K M Kasikoen. "Urbanization and Land Use Changes in Peri-Urban Area using Spatial Analysis Methods (Case Study: Ciawi Urban Areas, Bogor Regency)", IOP Conference Series: Earth and Environmental Science, 2018 Publication	<1 %
32	jurnal.univpgri-palembang.ac.id Internet Source	<1 %

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		