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EMERGENCES OF GULON INFORMAL SETTLEMENT IN SURAKARTA CITY: PERSPECTIVES ON THE PRODUCTION OF SPACE AND RHYTHMANALYSIS

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ABSTRACT

Increasing population growth and limited residential land occur in most urban areas in Indonesia. The government has well-observed regional spatial planning (RTRW) and regulations, but there are often deviations, such as the emergence of informal settlements. This study seeks to clarify the background of the establishment of informal settlement through the production of space theory and identify how society shapes the rhythm of life in producing space. Data collection is carried out by observation, interview, participatory mapping, and temporal imagery. This research uses progressive regressive methods with the production of space theory perspective and rhythmanalysis. Rhythmanalysis is used to complement the exposition of the production of space theory. It is known that the settlement space began to be formed in 2004. Residents interpret the Gulon informal settlement location as a strategic and effective cheap livelihood location. This choice of place to live is further strengthened by the similarity of the community's economic conditions which are increasingly deteriorating, made worse by the impact of the Covid-19 pandemic. This situation encourages interaction in the rhythm of people's lives so that the concept of residential space is formed. Polyrhythmics strengthen the phenomenon of space utilization.

Keywords: *Production of Space; Rhythmanalysis; Settlement; Surakarta City*

INTRODUCTION

Land use change occurs significantly in developing countries (Vadrevu et al., 2019). Land use change is estimated to have happened with almost one-third (32%) of the global land area in 1960-2019 (Winkler et al., 2021). The results are about four times greater than previous long-term land change predictions. Increased population growth also affects land use change (Prihatin, 2016). The growing population is in line with the demand for land to meet the needs of the board or residents. Indonesia ranks fourth with the largest population in the world (Worldometer, 2022). The negative consequence of the

population growth rate is the lack of land availability (Lutz et al., 2014).

Surakarta City experienced an upward trend in the population growth rate from 2018-2021, with successive growth rates of 0.35%, 0.33%, and 0.43%, respectively (BPS, 2022). The land use of settlements in Surakarta reaches 61.69% of the total area, with the availability of vacant land of 2.33% (BPS, 2022). The city provides complete facilities and jobs that attract a person to live in. Workers in urban areas assume that living in a city can save costs and energy for daily commutes (Holden & Norland, 2005).

Urbanization on Java Island triggered a significant growth rate in built-up areas (Handayani et al., 2020). On the other hand, the environment has a limited capacity to support sustainable living. The UN agency 2015 developed the SDGs (Sustainable Development Goals) to maintain sustainability from one generation to the next. Slums are one of the problems faced by various major cities in Indonesia. Settlements in riverbank areas that grow uncontrollably have formed slums and degraded the primary function of riverbanks (Pramantha et al., 2021). The Indonesian government, through Bappenas, seeks to address slum areas through three central policies: creating an enabling environment, improving the quality of the slum environment, and preventing the formation of new slums (Buchori, 2014). The situation on the ground, some of the growth of the area is continuing because the people who inhabit the slums have a weak position in the competition for urban land (Hasanawi et al., 2019).

The emergence of new settlement spaces on the border of the Bengawan Solo River in Jebres District indicates the creation of new areas that not suitable with the Surakarta City RTRW. The land crisis leads communities to create new settlement opportunities on vacant land without considering RTRW (Representation of space). The increase in residents or migrants will undoubtedly encourage growth in the need for residential space, especially in unplanned housing and settlements (Nursyahbani & Pigawati, 2015). Their poorly accessed location characterizes the formation of unplanned settlements and a lack of infrastructure. When people cannot occupy planned settlements, they will occupy potential lands without regard to environmental aspects and existing limitations. Gulon

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Informal Settlement is a form of creating a new space for settlements.

Rhytmanalysis is an approach to identifying everyday behaviours in occupying space (Alhadeff-Jones, 2019). The system is used to decipher and analyze the rhythms in space and the effect of those rhythms on their inhabitants. Lefebvre explains rhythm analysis as a method of determining the relationship of social space in industrial societies, such as cyclical rhythms (day and night, moon and seasons) and linear rhythms (monotonous sequences of numbers). Lefebvre begins the study of rhythmanalysis on the premise that where there is an interaction of place, time, and energy expenditure, that is where there is a rhythm (Lefebvre, 2004). Edensor has drawn attention to some contested and contextual rhythms generated through the road (Edensor, 2010). Rhythms can be identified regardless of the dynamic characteristics of the place, and the way of walking is part of the rhythmic circuit through which (back) is produced.

Adam suggests that the difference in form from tempo, time selection, duration, sequence, and rhythm are interimpliatory time structures (Adam, 1998). In that context, rhythmanalysis is very useful in investigating different temporalities such as calendar, diurnal and lunar, life cycles, siomatics, and mechanical, whose rhythms provide a continuous role in the experience of time structures. As will be shown in this article, the study of the rhythm of life also involves multidimensional, i.e., the space-time dimension.

Some research developed an alternative method of keeping track of rhythms, namely time-lapse photography, to observe the rhythms of residents in The City of Bath, England (Simpson, 2012). The audio-visual montage explores daily rhythms at Billingsgates Fish Market (Lyon, 2016). Farrington (2020) was inspired by space production theory and rhythm analysis to explore spatial configuration, sound and intensity, confrontational rhythms, and the effects of crowd fluctuations at protest events in Minneapolis (Farrington, 2021). Moreover, Nash (Nash, 2020), through interview data, shows the relationship between rhythm and the performance of space, the subjective foreground, manifested as a way of experience researching the organization of places and spaces in London.

In this study, the rhythm will be explored by various data collection

methods that can display physical and social rhythms in space. Geographic Information Systems provide a temporal-spatial analysis feature that allows the observer to understand the historicity of space physically. It can reveal trends and overall movement patterns (Zhong et al., 2012). It is in line with Lefebvre's thought that social space is studied by knowing the vertical complexity (historicity of space) and horizontal complexity (the condition of society in a given historical period) (Yusup, 2016) and rhythmanalysis research has been developed with various variations. This research aim to analyse of the rhythm of land change through landsat temporal aerial imagery, identify how the rhythm of people's lives in using space, and explain the background of how society forms new spaces for settlements.

MATERIALS AND METHODS

Regressive-progressive method was used in this study to investigate the development of space production. The rhythm of analysis determined the residents' life rhythm in producing new residential spaces in Jebres District, Surakarta City.

Data collection of population life rhythms was carried out using random sample representing the population. Combining random sample with empirical factors is better (Leite Mariante et al., 2018).

Data collection is carried out by observation methods to observe daily activities, interviews to explore historical information on the formation of settlements, tapping temporal images to find out the growth of settlements, and participatory mapping to find out wherever and whenever the population is active in the settlement space. Data collection was carried out for three days, from 25 – 27 July 2022. Data were analyzed by regressive-progressive methods to obtain the historicity of space, land change rhythm, and everyday life rhythm.

RESULTS AND DISCUSSION

The Production of Space: Gulon Informal Settlement

The production of informal space occurs through dialectical continuity between physical aspects, namely perceived space (buildings, infrastructure, services), the symbolic meaning of living space related to identity, culture, and ideology, and its influence on the space contained, namely state laws and regulations (Ellegård, 2018).

The formation of Gulon Informal Settlements cannot be separated from the spatial triads' interaction process, which is in harmony with each other. It was proven that in the years before 1977, space representation, spatial representation, and spatial practices supported the formation of settlements. The pioneers said that the land west of the Bengawan Solo River was close to livelihoods namely rivers and agriculture. In line with Sastika & Yasir (2017) Rivers are sources of livelihood that support political, transportation and economic power. Sponsored by the absence of spatial representation in the form of government policy in establishing the UNS campus, residents can to build a house anywhere. Therefore, Pethak Hamlet can exist without conflicts between spatial dimensions.

Gulon informal settlements are uncertified settlements located on the riverbank and within the Campus Area of Ngoresan, Universitas Sebelas Maret (UNS). Universitas Sebelas Maret is one of the state universities in Surakarta City which has obtained a land area of approximately 60 hectares based on the Mayor's Decree dated October 18, 1976 number 238/Kep/T3/1976. The 60 hectare land includes Pethak Hamlet which became the forerunner of Gulon Hamlet and the Gulon Informal Settlement. As Mulato said, one of the pioneer residents, "In the past the land from Mount Kendil to Bengawan Solo was occupied freely, in this area it was called Dusun Pethak, inhabited by my ancestors, so most of them here are all relatives".

The concept of space has been dissolved into the abstraction of thought by stakeholders; in this case spatial representation has been formed and controls spatial practice in the form of population movement to the surrounding area, and only vacant land remains on the riverbank used for farming. As happened in Johor Bahru, the practice of controlling space by stakeholders occurs precisely when urban capitalists take over space for modernism. The government's deterministic planning policies and public-private development have aggressively modernized, privatized space, granted privileges to Bumiputera, and encouraged further social segregation (Nasongkhla & Sintusingha, 2013). Spatial practice and representation of residential spaces have followed what is stated in the

representation of space, namely the UNS campus.

The development of the Gulon Informal Settlement began in 2004 when the land owner used his land to build a house. The riparian area is not included in the land used to construct the UNS campus, and spatial representation in the form of RTRW is not yet available. Armed with land belonging to the family, the first person, Ibu Patmi, built a house and interpreted the space adjacent to the river as a living space. The three triads of social production space have not seen any friction and tend to be harmonious in forming residential spaces. This process lasted for three years, from 2004-2006.

The appearance of the first house became the pioneer of the increasingly open riverbanks for settlements. This gave rise to the idea of buying and selling land for investment and the need for houses for other people who do not come from the landowner's family. As said by Bernadeta (44), “This used to be arable land and then it was sold; I received information from people that there is land here, then my parents bought land here, it is like compensation for cultivators, and there are also those who buy it but sell it again." Efforts to expand settlements continue to form settlement patterns that extend along the river and continue to experience settlement growth.

From 2007-2015 there was a drastic change in land use which was originally cultivated as a residential area. Changes in land use are closely related to the increase in the need for land for housing at low prices. According to Zehra et al., (2019) Informal settlements adjacent to floodplains tend to be occupied by low-income people. Bernadeta (44) revealed that the price of land in that place was cheap, buying it for Rp. 6,000,000.00 with an area of 50 m^2. In the 2007-2015 period, spatial representation in the form of RTRW was formed by the government through Surakarta City Regional Regulation No. 1 of 2012 concerning Surakarta City RTRW 2011-2031. Gulon Informal Settlement is a river border area based on the Surakarta City Spatial Plan for 2011-2031. It can be seen that there is a materialism dialectic between space representation and spatial representation, that the Gulon Informal Settlements are actually formed because the residents understand the riparian space as a place that provides a livelihood and is the remaining land owned by them. However, the community's understanding of space is

not in line with the representation of space as stated in the RTRW. In line with Lefebvre (1991) that space is a social product, where people in everyday life cannot be fully explained by theoretical analysis, there will be residues or residues that escape from the concept of theoretical thinking. Even though urban capitalists have arranged spaces in such a way, social practices still produce new spaces, as happened in the Gulon Informal Settlements.

Table 1 and **Figure 1** show that the production of illegal settlement spaces accelerates the rhythm of land change.

Table 1. Historicity Production of Space: Gulon Informal Settlement

Year	Moment	Spacial Practice	Representation of Space	Space of Representation
< 1976	Pethak Hamlet	Pethak Hamlet, from Mount Kendil towards the northeast to the Bengawan Solo River	-	A place of livelihood, close to rivers and land suitable for moorings.
1977	Establishment of UNS Integrated Campus	Pethak hamlet was vacated. The movement of residents to the surrounding area.	UNS Campus Area. Decree of the Mayor of Surakarta dated October 18, 1976, number 238 / Kep / T3 / 1976.	Construction of Ngoresan Campus. The border of the river became the arable land of the indigenous people of Pethak hamlet.
2004	Establishment of the first House	The establishment of the first house on arable land	UNS Campus	Use of Arable land for occupancy by land owners
2005-2006	Establishment of the second and third houses	Establishment of the second and third houses by relatives of the first inhabitants	UNS Campus	The use of family-owned Arable land on the riverbank to build a house that became the forerunner of the Gulon Informal Settlement.
2006-2015	Addition of houses and land as a means of investment.	The construction of houses is increasingly rampant. The surrounding people have called it the term "new civilization." Installation of street lights and electricity entered the settlements officially.	River Border Area. RTRW Surakarta in 2011.	Arable land owners sell to people who need land at low prices—obtaining economic value from the sale of land. Land as a means of investment, some buy and sell again.
2015-2019	Hatching by new landowners and the addition of	Establishment of semi-permanent buildings as an effort to make land certificates	River Border Area. RTRW Surakarta in 2011.	The domination of feelings is equal to the serenity of the land, and the pursuit of land

Year	Moment	Spacial Practice	Representation of Space	Space of Representation
	new homes			certificates collectively
2019-2022	Equitable distribution of settlements	Land clearing in the north so that a settlement pattern has been formed, extending toward the river border. It is still working on the creation of land certificates collectively. Paving roads are formed. Organizing initiatives for independence race activities.	River Border Area. RTRW Surakarta in 2011.	The northern land, ancestral-owned land now owned by some residents, formed a sub-settlement in the north.

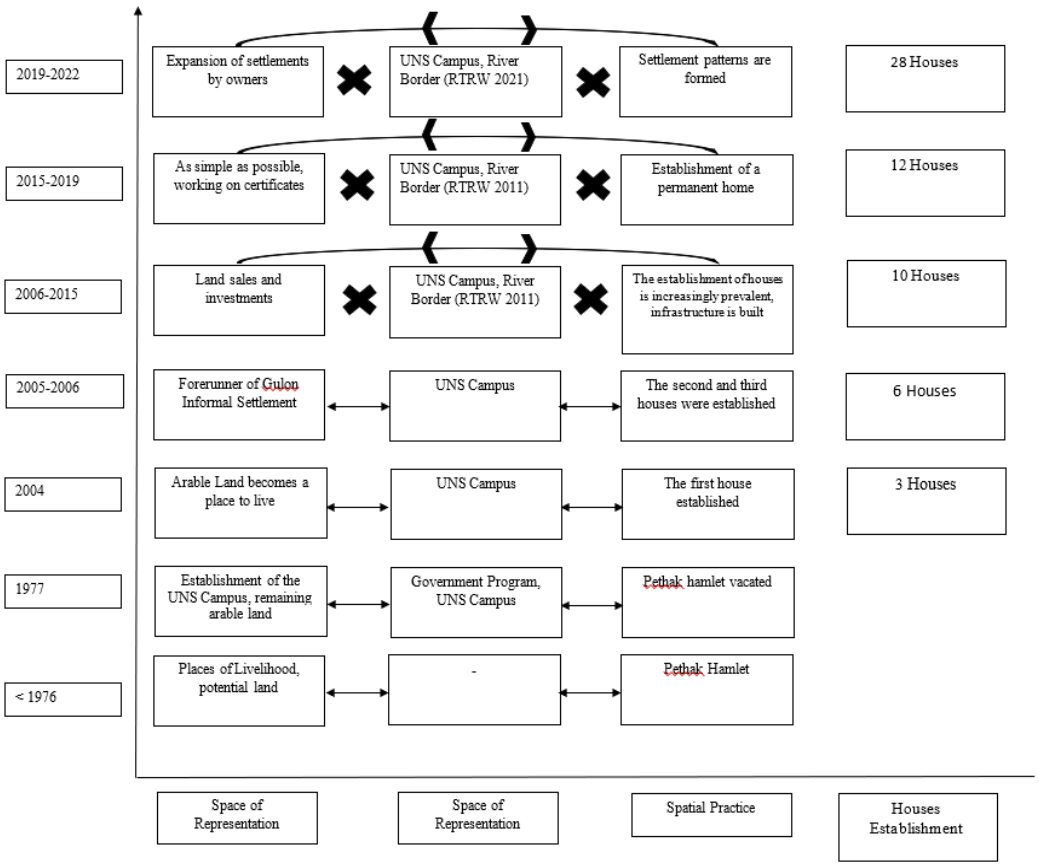

Figure 1. Diagram of Historicity Space-time Gulon Informal Settlement

Various attempts have been made by the Gulon Informal settlement community to appropriate vacant land into residential space, including building a PLN electricity network throughout the settlement, building paving block roads, constructing permanent buildings, and even taking legal action to obtain land certificates collectively. As Listyawati (43) said, "*it's getting busier and better here than before, PLN's electricity has been able to enter and paving block roads have also been installed because we received assistance from the RW*."

Settlement expansion continues through 2019-2022, heading north. Previously, settlements were only concentrated in the central part to the south, as shown in Figure 3—a picture of Gulon Informal Settlements. The expansion was carried out during the COVID-19 pandemic. The current condition of the settlement pattern has been formed along the river banks. In the production process of residential space, the three space triads rub against each other. Spatial representation in the Surakarta City Spatial Plan for 2021-2041 still represents settlement locations as river banks, while spatial practices and space representation show otherwise.

Listyawati (43) imagines and describes how residents of the Gulon informal settlement will produce residential space in the future:

"*When the ATR/BPN has approved the land certificates that we have submitted, we can imagine our settlements will be more crowded. BPWS (River Basin Development Agency) has measured the distance from the river, and the location of our settlement can be said to be outside the specified distance. We have planned to build the facility by building a bridge for access outside the settlement so we don't take a detour. Structurally, we also envision an RT forming in this settlement, so we don't live in an RT outside this settlement."*

What Listyawati explained is still an illustration of the possibility of creating space in the future, which manifests the transformation of social practices. If this picture occurs, then the production of residential space which was originally informal will change to be formal. The triad of space will not conflict. Spatial representation in the form of a river bank will turn into a settlement by spatial practices and spatial representation so that the spatial production construction can be seen as shown in **Figure 2**.

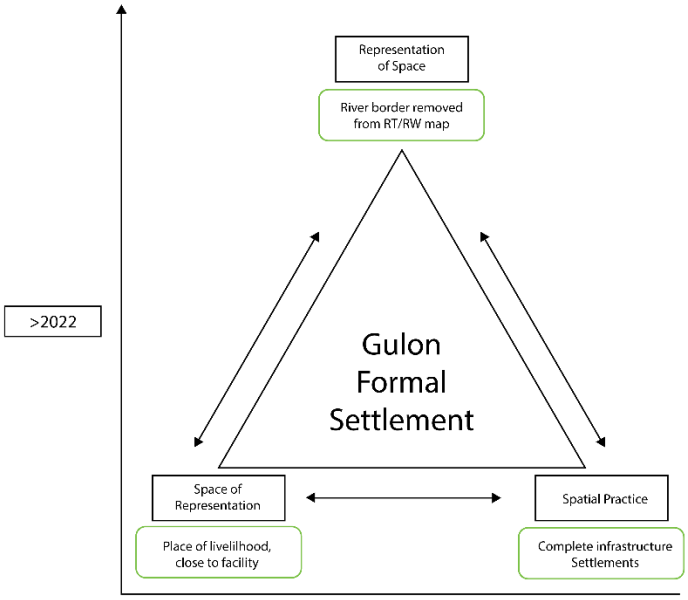

Figure 2. Diagram Production of Space Future Possibility Gulon informal Settlement

The Acceleration of Land Use Change

Land use/cover change (LULC) was analyzed using satellite imagery. Informal Settlements of Gulon on maps for each period can be seen in **Figure 3**. According to the National Land Use Database (NLD), the results of the land use classification show six land uses, including agriculture, pasture, water, settlements, public buildings, and vacant land.

Over the past 18 years, significant changes have been seen in the increase in the forms of settlements built. Space production began in 2004 through the construction of residential houses followed by other developments until now. Residents are aware that actions are being carried out on uncertified land. They admit that buying land from cultivators is much cheaper than the normal price. The urgency which is generally related to economic limitations forces them to produce space which so far has more than 20 families.

Gulon informal settlement is located in a river border area with no buildings. Vegetation on the banks of the river serves as a restoration to maintain water quality (Anggana & Susanti, 2020). However, over time the land is no longer used according to its designation. Changes in land use in the Gulon Informal Settlement occurred in 2004. Originally LULC was the construction of one house followed by two more until 2006. From 2007 to 2009 there

were no LULCs, which began to increase in 2010. Additional buildings in 2010-2018 totalled nine houses with a northward moving pattern. The rhythm of changes in land use is accelerated along with the needs of land use. Rapid growth occurred in 2019-2021, namely 12 houses with a pattern of widening to the north. This pattern is not the distribution of buildings in 2010-2018 but forms a separate new pattern in the northern part (see **Figure 4**).

Two things underlie the construction of buildings in the Gulon Informal Settlements. The first is the assumption that the land belongs to the ancestors, so it becomes an inheritance. The second is economic difficulties that make it impossible to buy legally certified land. Residents who build buildings in 2019-2021 are generally affected by the pandemic. The sudden onset of the COVID-19 pandemic caused a global economic shock (Nicola et al., 2020). They admit that they lost their jobs and were forced to live in the Gulon Informal Settlement because they had no other choice.

2004

2008

2013

2018

2021

Figure 3. LULC Changes in Gulon Informal Settlements in 2004, 2008, 2013, 2018 and 2021

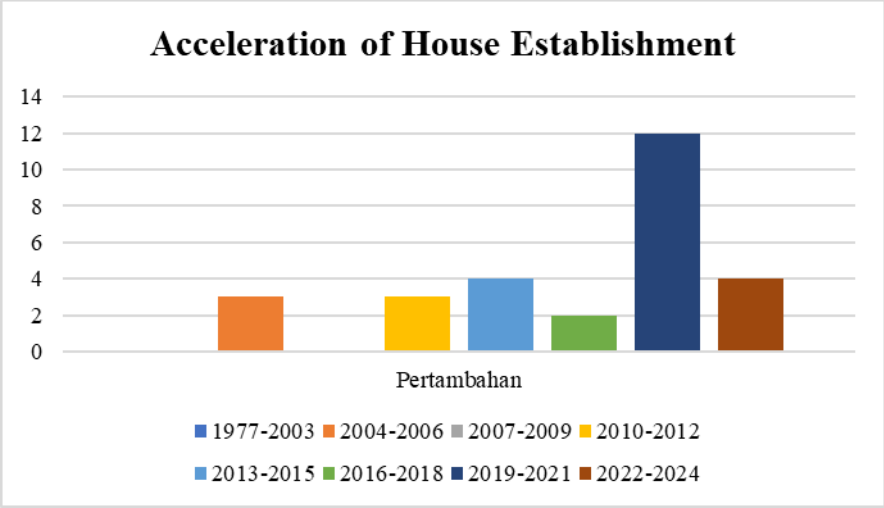

Figure 4. Diagram of House Establishment

Everyday Life Rhythm of Gulon Informal Setllement

People's behaviour in occupying space produces an order, namely body rhythms (sleeping hours), mobility rhythms (travelling, work, school, play), place rhythms (streets of settlements, houses, fields, patrol posts) and natural rhythms (day and night which determine activity) in the form of a series of activities, time and place in a space that forms the rhythm of everyday life. The formation of every life

rhythm signfies a community's maturity in appropriating vacant land into a settlement. People in Gulon Informal Settlements are divided into six daily activities categories: workers, breeders, entrepreneurs, students, housewives, and the unemployed. A rhythm of life that describes the interaction of society with space and time. The rhythm of life in the Gulon Informal Settlement has occurred since 2004 until now. The rhythm of daily life in the Gulon informal settlement is shown in **Figure 5**, **Table 2** and **Table 3**.

Residential space is the result of repeated activities that have continuously occurred for years to form an everyday life rhythm. The rhythm of everyday life in society, including workers, breeders, entrepreneurs, students, housewives and the unemployed, runs linearly and side by side. The six categories of people in Gulon Informal Settlements have different rhythms of life. Although they have different life rhythms, there is an intersection of activities through the use of shared space. The overlap of activities in the Gulon Informal Settlement space signifies the harmonization of settlement rhythms that form a single unit. The harmony of the rhythms of daily life is formed through the interaction between the rhythms of society. There is a strengthening of the phenomenon of use of space following the concept of polyrhythmia.

Table 2. Everyday Life Activity

Worker (Men)			Work				Patrol	Sleep
Worker (Woman)	Wake up	Homework	Work				Sleep	
Breeder	Wake up	Homework			Mengembala		Sleep	
Entrepreneur	Shoping	trade					Sleep	
Student	Sleep	Wake up	School	Go Home	Playing	Go Home	Sleep	
House wife	Sleep	Wake Up	Shopping	Hanging Out		Go Home	Sleep	
unemployment	Sleep			Hanging out				Sleep
	05.00	06.00	07.00	12.00	15.00	17.00	22.00	24.00

Table 3. Daily Activity Place

Worker (Men)	House		Office				Pos	House
Worker (Woman)	House	House	Office				House	
Breeder	House				Field		House	
Entrepreneur	Market	Settlement Street					House	
Student	House		Sekolah	Rumah	Field	House		
House Wife	House		Settlement Street	Stall		House		
Unemployment	Rumah			Pos				Rumah
	05.00	06.00	07.00	12.00	15.00	17.00	22.00	24.00

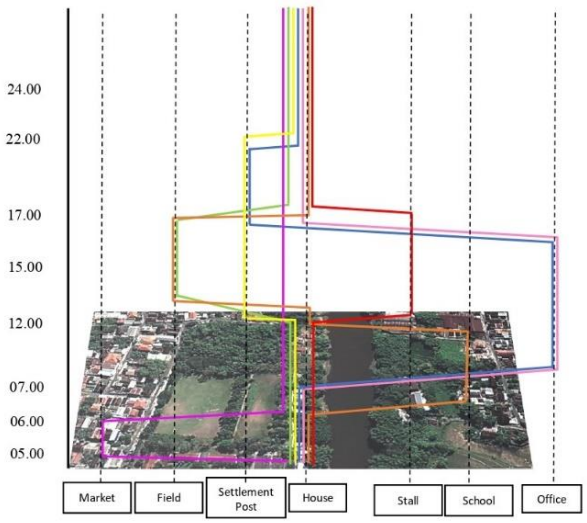

Figure 5. Everyday Life Rhytm in Gulon Informal Settlement

CONCLUSIONS

The Gulon informal settlement was originally part of Dusun Pethak, close to livelihoods of the Bengawan Solo river and agriculture. At first, residents interpreted the area as taking advantage of the living, but since the construction of the UNS campus in 1977, you have to move around. The UNS campus construction project leaves arable land adjacent to the Bengawan Solo River. The land is no man's land, but there are still people who cultivate the land. In 2004, the first house was built by the landowner and his relatives. Land changes that occurred for 18 years (2004-2022) formed the Gulon informal settlement pattern. The practice of changing land into built-up is generally based on economic factors. The construction of homes continues because it is supported by information about the availability of cheap land and the number of housing needs. LULC changes are expected to continue due to the availability of non-built-up land. Finally, in 2022 reached more than 20 houses. Settlements are more clearly

formed with infrastructures like road paving blocks, electricity, and permanent buildings. The population increases along with the increase in buildings. There are six categories of society based on the rhythm of their lives. The Gulon informal settlement space is where their activities intersect, forming a harmonized rhythm.

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