

Factors and Stages of Dynamics Spatial Development in 1970-2023 at *Kampung UMKM*, Rejoso Village, Batu City, East Java, Indonesia

Fernanda Ayuning Putri¹, Herry Santosa¹, Agung Murti Nugroho¹

¹Department of Architecture Built Environment, Faculty of Engineering, Brawijaya University, Malang, Indonesia

Abstract— *Space is one of the architectural elements that continue to change if the space is always used as a container for activities. This study aims to look at the spatial changes in Kampung UMKM in Rejoso Village through mapping in 2005, 2012, and 2021. The factors and stages of spatial changes are analyzed through the in-depth interview method in the context between 1970 and 2023. The results of the mapping show that there are 4 points of change in village space. The combination of spatial mapping and interviews shows that several factors influence changes in the space of the Kampung UMKM, where the Environmental Conditions (EC) and Socio-Cultural Activities (SCA) factors are the most influential factors. While the stages of the spatial dynamics of Kampung UMKM are Environmental Changes - The privatism process - the Bordering Process - Labeling process.*

Keywords— *Dynamic Spatial, Factor Dynamic Space, Stage of Dynamic Space, Kampung UMKM, Rejoso Village.*

I. INTRODUCTION

Kampung UMKM, Rejoso Village, Batu City was inaugurated in 2019 which is the result of the empowerment and development of UMKM in Batu City which aims to overcome the problems of unemployment and poverty [1], [2]. MSMEs have a very important role in improving the community's economy in addition to the tourism sector because of the ability of MSMEs to develop new ideas into innovations, thus MSMEs have high flexibility in dealing with the uncertain economy of developing countries. Society can easily develop new products according to the needs of buyers. MSMEs are required to focus on significant innovation factors that will help them maintain global competition.

Unlike the industrial space that was built specifically, the business space in the *Kampung UMKM* is formed side by side in harmony with the residents' settlements. The *Kampung UMKM* community tends to try to optimize its local assets for the welfare of the community through creative ideas that make it a Creative Village entity [3]. The formation of MSMEs started from a small home industry which then developed by increasing market demand and as an effort to improve the economy of the residents of Rejoso Hamlet [4].

The formation of adjoining business and settlement spaces has led to critical thinking on how spatial patterns are formed so further studies are needed on the spatial dynamics formed through mapping analysis. The occurrence of a spatial dynamic due to the activity of craftsmen is in contrast to El-Darwish's thinking [5] which states that the quality of a space depends on structured planning with several considerations through several recommendations, guidelines, and specific steps. Research on

spatial dynamics is expected to provide answers regarding the formation of a residential space adjacent to a business space. The benefits of this research are also expected to become an important idea that can help future researchers to develop a good management system for the development of sustainable business space based on creative urban village theories that contain local wisdom values.

II. METHODS

The research to be conducted is a qualitative-descriptive type. Descriptive qualitative research is expected to be able to provide a complete picture of the research object and provide more detailed research results. Qualitative research is meant as a type of research whose findings are not obtained through statistical procedures or other forms of calculation [6], [7]. Furthermore, qualitative research was chosen because of the stability of researchers based on research experience and qualitative methods can provide more complex details about phenomena that are difficult to reveal by quantitative methods [8]. The qualitative research process is expected to produce findings that are truly useful requiring serious attention to various things that are deemed necessary. In discussing the qualitative research process, at least three things need to be considered, namely the position of the theory, research methodology, and qualitative research design.

This research was conducted in three stages. The first stage is re-mapping or reconstruction techniques needed to obtain a complete spatial picture in spatial dynamics research. The data used in the re-mapping stage are satellite photos taken from Google Earth and selected several years with various considerations. Satellite map analysis uses solid-void techniques or figure-ground theory. The second stage of this research is to analyze the factors that cause spatial dynamics, where data related to the research focus are collected through systematic observation and recording of the symptoms that appear on the research object. The in-depth interview technique is also used to construct people, events, organizations, motivations, feelings, and so on. The third stage of this research is to reconstruct the occurrence of spatial dynamics from the results of the factor analysis in the second stage. Several indicators from the twelve stages of spatial dynamics were identified and analyzed through the phenomena found in the field.

III. RESULTS

Kampung UMKM is an identity for Dusun Rejoso which is located in Junrejo Village, Junrejo District, Batu City, East Java Province, Indonesia. Geographically, Dusun Rejoso is located between 112.556359°- 112.559170° East Longitude and - 7.897938°-7.904466° South Latitude. Rejoso Hamlet is located at an altitude of 768 – 711 meters above sea level with relatively cool air conditions where the average annual rainfall is 30 mm and the average temperature is 21 °C-30 °C. The population of Rejoso Village is 1,928 people with a male population. - 1,015 people and a total female population of 913 people.

Rejoso Village is located on Jalan Trunojoyo and has an area of 73.60 ha which consists of 2 RWs (RW 009 AND RW 010). RW 009 consists of 3 RTs and RW 010 consists of 4 RTs. Access to Rejoso Village can be done in 4 ways, namely via Jl. Ir. Soekarno (north direction), Jl. Hasanudin (south direction), Jl. Patimura (east direction), and Jl. Trunojoyo (west direction).

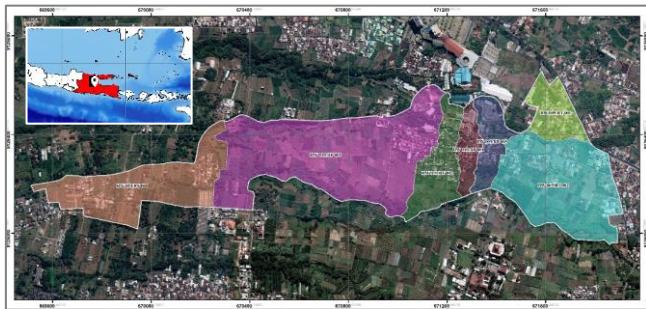


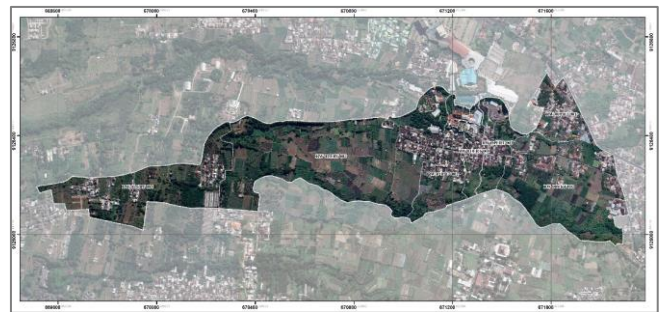
Fig. 1. Administrative map of Kampung UMKM, Rejoso Village

A. MSMEs Village Mapping

Mapping was carried out to see the physical changes in the Kampung UMKM in 2005, 2017, and 2021. This year was chosen to take into account the availability of satellite map data taken from Google Earth. The 2005 map is the first satellite map available on Google Earth (Fig. 2a). The purpose of taking this year is as the first physical evidence before a larger change in village space takes place. The 2017 map is the time before the development of nearby tourism areas (Fig. 2b). The intended tourism area is Jawa Timur Park 3 which is in the northern part of Rejoso Village. The development of this area is one of Batu City's major projects to attract tourists to visit. The 2021 map is the most recent map available on Google Earth (Fig. 2c). This latest satellite map was taken with consideration of obtaining the latest physical evidence from Rejoso Village.

These three maps will then be analyzed through solid-void techniques or figure-ground theory by overlaying these three maps. Changes and shifts in satellite photos are minimized by using the Georeferencing tools in the ArcMap GIS application.

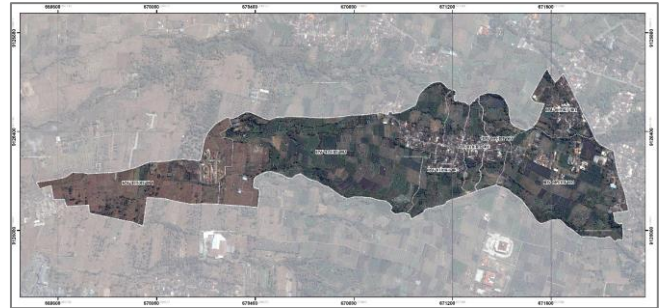
To see the point of change in that year, a solid-void map analysis was performed. The land cover area in 2005 was 71,596.41 m². In 2012 there was an increase of 13%, to an area of 82,612.24 m². In 2021 there will be an increase in land cover by 20%, namely to 102,661.36 m². Changes are identified at Points A, B, C, and D (Fig. 3).



(a)



(b)



(c)

Fig. 2. Satellite Map of Kampung UMKM, Rejoso Village (a) 2021, (b) 2012, and (c) 2005

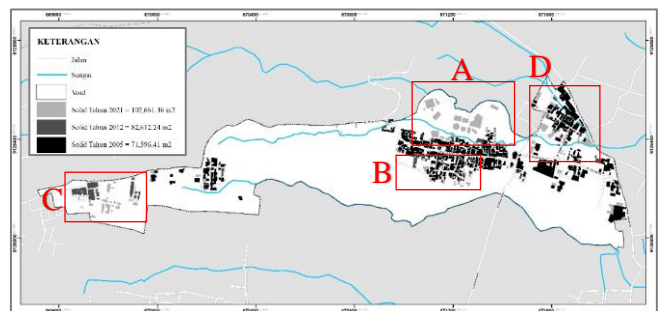


Fig. 3. Spatial Change Points on the Solid-Void Map of Kampung UMKM, Rejoso Village in 2021, 2012 and 2005

B. Factors for Change in MSME Village Space

Based on the results of the interviews, several factors greatly influence changes in space in the Kampung UMKM. Dynamic Factors (DF) analyzed in this study are Environmental Conditions (EC), Socio-Cultural Activities (SCA), Population Growth Factors (PGF), Economic Factors (EF), and Mindset Factors (MF) which are described in table 1.

TABLE I. Factors Dynamic Space in *Kampung UMKM*

DF	Levels		
	Low	Medium	high
EC	Natural Disasters		Land Use
	Local Climate		Land Slopes
	Land Dependence		
SCA	Social Status	Users	Activities
	Social Organization		History
			Human Character
PGF	Ratio Age Level		Kinship
EF			Economic Level
MF	Religion		Organization Vision

Dynamic Factors (DF): Environmental Conditions (EC), Socio-Cultural Activities (SCA), Population Growth Factors (PGF), Economic Factors (EF), Mindset Factors (MF)

Environmental Conditions (EC) indicators that can trigger spatial dynamics are changes in land use, natural disasters, local climate, land slope, and land dependence [9], [10]. In *Kampung UMKM*, changes in land use at point A are triggers for several changes to occur at other points. Changes in the function of agricultural land into a large tourist area, namely the construction of Jawa Timur Park 3 in 2018 to increase the income of the community which also has a focus on local tourism, namely *Kampung UMKM*. *Kampung UMKM* offers industrial tourism destinations that also attract tourists to visit, apart from visiting the East Java Park 3 tourist attraction.



(a)



(b)

(c)

Fig. 4. Changes in Land Use Point A (a) 2021 Satellite Map, (b) 2012 Satellite Map, (c) East Java Park 3

Changes that occur due to the construction of new tourist areas trigger changes at points B and Point D. Meanwhile, the areas between points B and C are empty due to the steep slope of the land in that area, due to the presence of a river in that area. The community tends to crowd point B and also point C which aims to expand the MSME business area.

Stone craftsmen and wood craftsmen have different characteristics, so there are several changes in space due to changes in this activity. Stone craftsmen tend to need less space for their business, while wood craftsmen need more space. This space requirement results from the need for space to dry wood

and process wood into products ready for sale. Some wood craftsmen take advantage of spaces that are far from settlements so that their activities do not disturb residents in the *Kampung UMKM*.



(a)

(b)

Fig. 5. Changes in Point D Area (a) 2021 Satellite Map, (b) 2005 Satellite Map

Changes in space as a result of Socio-Cultural Activities (SCA) can be seen from social status, social organization, the flow of activities of space users, space users, background of space owners, flow of activities or local culture, history, and human character [11], [12]. In *Kampung UMKM*, there are changes in activities that occur, namely the business activities of stone craftsmen to become wood craftsmen. The graph of MSME growth from 1970 to the present is shown in Fig. 6. The graph shows that there is a decrease in the Stone Craft MSME group from year to year. Meanwhile, groups of wood craftsmen began to grow and develop from 1980 until now.

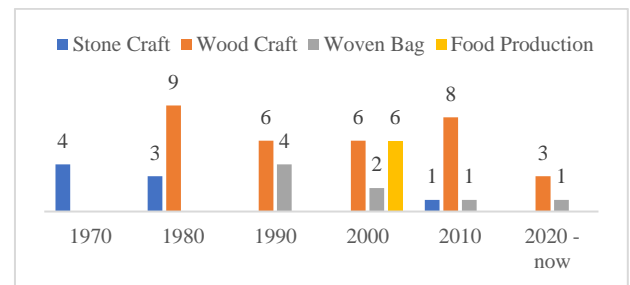


Fig. 6. Graph of MSME Growth in 1970 - now



(a)

(b)

Fig. 7. Space Requirements (a) Stone Craftsmen, (b) Wood Craftsmen

Apart from point D as a marker of changes in space due to the expansion of business space, there is also a satellite photo of changes in space at point B (Fig.8). Changes in the village pattern tend to be towards the south compared to the empty area which is in the western part of Rejoso Village.



Fig. 8. Changes in Point B Area (a) 2021 Satellite Map, (b) 2005 Satellite Map

The history of the *Kampung UMKM* began with the Craft Tourism Village which was inaugurated in 2010 [4]. Over time, the Craft Tourism Village was no longer suitable for branding Rejoso Village due to the emergence of several other business centers. Since 2019, the Craft Tourism Village has officially turned into a *Kampung UMKM*. When traced from the year the business was formed, the first stone craftsmen were founded in 1972, namely Cobek Batu Suliyat, Misno, and Poniman. However, the community believes that the existing stone craftsmen are a legacy of the Singasari Kingdom. It is said that one of the travelers from the Singasari Kingdom opened Rejoso Village and settled in the area several years later for several generations. Punden Rejoso is one of the key witnesses to a place that is sacred to residents as part of the history of these nomads. Residents believe that the luck and fortune of the people of Rejoso Village come from their ability to be creative.

Initially, the stone craftsmen in this village looked for raw materials from Mount Panderman, which is 5-6 km from the village. Craftsmen travel in the morning and return in the afternoon bringing stone carvings into mortars and rough grinding. Craftsmen continue their activities at home, namely the process of grinding mortar and mortar into products ready for sale. Over time, the government issued a policy regarding the prohibition of taking stones from Mount Panderman. The stone craftsmen then buy raw materials from Ngantang, but these raw materials are limited and the price is quite expensive. Since 1980, wood craftsmen have replaced stone craftsmen. Apart from that, woven bag crafts and food production are also present as one of the community's creative efforts to get good income. Products produced by the people of Rejoso Village are in great demand by domestic and foreign consumers. Until now, people think that the current success of the community is a blessing, but if you want to be successful in running a business, the location of your business must be in Rejoso Village.

The trust of the people of Rejoso Village forms the character of the villagers, where businesses established by the previous generation must be continued by their children. The prominent character of the villagers is that they tend to process simple materials into high-value products. One of the UMKM players who is now pursuing new products is Mos Stone Garden, which was established in 2010. This UMKM is a group of stone crafts that have reappeared by utilizing lightweight or hebel bricks which are commonly found today as raw materials for making houses. These stone craftsmen carve lightweight bricks into

flowerpots, terracotta, and earthenware. This craft does not require a lot of space, so the craftsmen only use one of the rooms as a gallery.

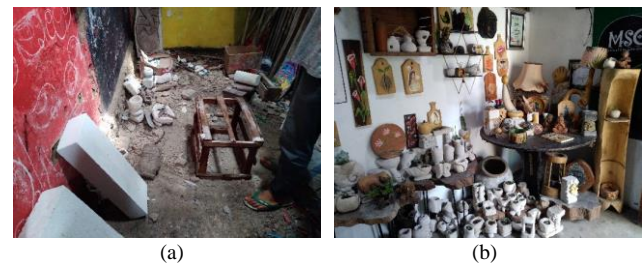


Fig. 9. MSME Mos Stone Garden (a) Business Area (b) Gallery

Population Growth Factors (PGF) can be seen through the historical flow of population entry into an area, kinship, the ratio of the number of residents with a certain age level, and the character of space users [13]. In this case, the kinship that exists in the *Kampung UMKM* influences changes in space and this can be seen from the greetings of one UMKM Kitchen Appliances Sanusi and UD Rizky. These two MSMEs have a kinship relationship so they create a joint drying and cutting wood area.



Fig. 10. New Space Due to Kinship Relations (a) Shared Warehouse (b) Finishing Area and Gallery

Economic Factors (EF) can be seen from the economic level of society which causes the need for a space to increase, the number of owners of a building can also indicate a person's economic level [13]. The development of the group of wood craftsmen made their income increase. With this increase in income, some craftsmen chose to separate their residential and business areas. Some craftsmen tend to have more than one building owner so that the business they run does not interfere with the privatization of their homes.



Fig. 11. Siti's Woven Bag UMKM (a) Material Cutting Warehouse (b) Owner's Residence

Mindset Factors (MF) are based on the similarities of several individuals and can be seen in family relationships, as well as based on similar views of life or beliefs of a community group [13]. Since the year the *Kampung UMKM* was inaugurated, the Rejoso Hamlet UMKM Association was also formed which was chaired by one of the Village residents. The Chairperson of UMKM has the vision to make *Kampung UMKM* a new tourist destination that can attract tourists. Adding cultural activities is one of the agendas proposed by the UMKM chairman. With this activity, Jalan Trunojoyo, which stretches throughout the village, has become a gathering area for residents. Other activities, such as the carriage which is held every year, make Punden Rejoso the center of activity. Punden Rejoso itself has been considered by the community as a sacred place where various activities such as cleaning the village and other important activities are often carried out.



Fig. 12. *Kampung UMKM* Activities (a) Raising the Giant Flag (b) Andong-Andong at Punden Rejoso

C. Stages of Change in *Kampung UMKM* Space

There are 12 stages of spatial change, namely the Privatism process, Clustering Process, Categorization Process, Classification process, Bordering Process, Labeling process, Mediating process, Inclusion–exclusion process, Marking process, Polarization process, Quartering Process, and Environmental changes [14]. In *Kampung UMKM* there is a change in space triggered by several factors previously described. Changes that occur through several stages are as follows.

Changing rice fields into new tourist areas causes environmental changes called Environmental Changes [15]. On the satellite maps of 2005 and 2012, a small river is still found which is a tributary of the Brantas River and is one of the boundaries of Rejoso Village to the north. However, in 2021, this limit will no longer be recognized. Changes in land use at Point A are one of the triggers for the emergence of *Kampung UMKM*.

Kampung UMKM is in the Rejoso Village area which is divided into 7 RTs. However, the *Kampung UMKM* territory only exists in 6 RTs based on the similarity of views regarding the business they are undertaking. The process of merging MSME groups into one identity of *Kampung UMKM* in 2019 is a Privatism process stage. The stages of privatism in this process make a group more stable with these changes being influenced by common thinking and an effort to defend its territory [16]–[19].

The *Kampung UMKM* provides clear boundaries regarding its identity by providing flags along the side of the road and also adding rows of flower pots arranged along the road of the

Kampung UMKM (Fig. 13). These restrictions are used to provide directions for tourists and as an indirect travel boundary. The process of limiting activity space and clarifying a function in this area is the Bordering Process stage [20], [21].



Fig. 13. (a) Condition of *Kampung UMKM* (b) Condition of RT 004 RW 010

In addition to providing clear boundaries, the *Kampung UMKMs* also labeled or named the entrance area to the *Kampung UMKM*, namely access to the north via Jl. Ir. Soekarno (Fig. 14a) and access from the east via Jl. Patimura (Fig. 14b). The process of giving a name and also for maintaining its territory is called the Labeling process [22], [23]. In the front area of the building or MSME point, an MSME nameplate is also added which shows the identity of each business with a design and size similar to one another. This shows that all MSME groups that are members of the *Kampung UMKM* identity have the same vision and mission.



Fig. 14. (a) Gate of *Kampung UMKM* (b) Entrance of *Kampung UMKM*

IV. DISCUSSION

The conception of space and place is explained as space which gives the possibility of movement while place creates pause [24]. In this study, it was found that *kampung* space tends to be stable over a certain period until there is a big trigger that influences it. The most influential factors for changing the space of *Kampung UMKM* are Environmental Conditions and Socio-Cultural Activities. One environmental change can change a particular group to cause a new boundary or a new naming process. The Trunojoyo street that stretches in this village is identified as the center of social activity in the *Kampung UMKM*. The social activity that occurred also changed the function of the main village road into a new shared space that aims to be a unifying element of one part of the village and the other.

The *Kampung UMKM* space created as a result of changes in the use of paddy fields in new tourism areas makes the concept of space as one of social production [25] an ambiguous statement when looking at the results of research on *Kampung UMKM*, Rejoso Village. Changes due to these physical factors

can generate new income for the community in addition to the results from sale of products resulting from their business, namely income from the industrial tourism sector. The more tourists who visit the *Kampung UMKM* and know this name, the community, especially the perpetrators and owners of UMKM, become attached.

Over time, the existing business focus on Kampung UMKM will develop following new trends and adapt to new materials. The strong historical background in Rejoso Village can bind the community in a certain mindset which requires the community to continue to live and develop within certain territorial boundaries. This restriction has also made Kampung UMKM a special village, which cannot be found in other areas.

V. CONCLUSIONS

The results of the mapping analysis in 2005, 2017, and 2021 found 4 points of village spatial change. The change points are Point A (north of Rejoso Village); Point B (southern part of Rejoso Village); Point C (western part of Rejoso Village); and Point D (eastern part of Rejoso Village). The development of the space between points B and C will tend to be empty in the long term due to the extreme slope of the land in this area.

Several factors influence changes in village space, namely Environmental Conditions (EC), Socio-Cultural Activities (SCA), Population Growth Factors (PGF), Economic Factors (EF), and Mindset Factors (MF). Among these factors, there are the most influential factors that change the SME Village space, namely Environmental Conditions (EC) and Socio-Cultural Activities (SCA). The dynamic stages of the *Kampung UMKM* space are as follows Environmental Changes - Privatization process - Bordering Process - Labeling process.

ACKNOWLEDGMENT

The authors are grateful to the residents of the *Kampung UMKM* in Rejoso Village of Batu City for their participation in this research.

REFERENCES

[1] L. I. Mindarti and A. H. Muzaqi, "Micro, Small, and Medium Enterprises (MSMEs) Empowerment Through Quadruple Helix Approach in Batu City," *Jurnal Natapraja: Kajian Ilmu Administrasi Negara*, vol. 8, no. 2, pp. 143–153, 2020, doi: 10.21831/jnp.v8i2.33363.

[2] R. A. Sembiring, T. Subekti, and M. M. Nia Bella, "Upaya Dinas Koperasi, Usaha Mikro, Dan Perdagangan (Diskumdag) Kota Batu Dalam Memberdayakan Pelaku Usaha Kecil Menengah (Ukm) Produk Tujuan Ekspor," *Journal of Governance Innovation*, vol. 2, no. 2, pp. 83–92, 2020, doi: 10.36636/jogiv.v2i2.384.

[3] N. Yuliasuti and A. M. Sukmawati, "Creative Urban Kampung Based on Local Culture, a Case of Kampung Bustaman Semarang," *Journal of Architecture and Urbanism*, vol. 44, no. 2, pp. 128–137, 2020, doi: 10.3846/jau.2020.11450.

[4] B. Azis, "Kearifan Lokal Masyarakat Kampung Wisata Kerajinan Tangan di Dusun Rejoso Kota Batu," *Local Wisdom*, vol. 9, no. 1, pp. 1–11, 2017, doi: 10.26905/lw.v9i1.1862.

[5] I. I. El-Darwish, "Enhancing outdoor campus design by utilizing space syntax theory for social interaction locations," *Ain Shams Engineering Journal*, vol. 13, no. 1, 2022, doi: 10.1016/j.asej.2021.06.010.

[6] J. W. Creswell, *Research design: qualitative, quantitative, and mixed methods approaches*, 4th ed. California: SAGE Publications, 2014.

[7] L. N. Groat and D. Wang, *Architectural Research Methods*, 2nd ed. Germany: Wiley, 2013.

[8] B. T. Pentland, C. A. Mahringer, K. Dittrich, M. S. Feldman, and J. R. Wolf, "Process Multiplicity and Process Dynamics : Weaving the Space of Possible Paths," *Organization Theory*, vol. 1, pp. 1–21, 2020, doi: 10.1177/2631787720963138.

[9] E. Junaidi and R. Maryani, "Pengaruh Dinamika Spasial Sosial Ekonomi Pada Suatu Lanskap Daerah Aliran Sungai (DAS) Terhadap Keberadaan Lanskap Hutan (Studi Kasus Pada DAS Citanduy Hulu dan DAS Ciseel, Jawa Barat)," *JURNAL Penelitian Sosial dan Ekonomi Kehutanan*, vol. 10, no. 2, pp. 122–139, 2013.

[10] C. P. Quinn and H. Ciugudean, "Journal of Archaeological Science : Reports Settlement placement and socio-economic priorities : Dynamic landscapes in Bronze Age Transylvania," *J Archaeol Sci Rep*, vol. 19, no. April 2017, pp. 936–948, 2018, doi: 10.1016/j.jasrep.2017.05.046.

[11] M. Amarullah, A. M. Nugroho, and J. Ernawati, "Proses Perubahan Ruang Sosioantropologi Arsitektur di Kawasan Pondok Pesantren Bungkuk Singosari," *Jurnal PAWON*, vol. 1, no. 2, pp. 69–84, 2018.

[12] I. Ardianti, Antariksa, and L. D. Wulandari, "Teritorialitas Ruang Sosial Budaya Pada Permukiman Etnis Madura-Hindu Dusun Bongo Wetan Gresik," *Seminar Nasional Arsitektur Pertahanan (ARSHAN)*, pp. 165–173, 2014.

[13] P. A. H. Wagiswari, N. W. Paramadhyaksa, and G. A. M. Suartika, "Dinamika Fungsi Ruang di Bale Banjar Titih Denpasar, Bali," *SPACE*, vol. 6, no. 2, pp. 147–158, 2019.

[14] D. Asikin, Antariksa, and L. D. Wulandari, "Dinamika Ruang Arsitektur Pada Permukiman Migran Madura Di Kelurahan Kotalama - Malang," in *Prosiding Temu Ilmiah IPLBI 2016*, 2016, no. October, pp. 1–6.

[15] C. Liu and F. Hao, "The impact of social and ecological factors on environmentally responsible behavior," *J Clean Prod*, vol. 254, p. 120173, 2020, doi: 10.1016/j.jclepro.2020.120173.

[16] S. Marvin, S. Graham, and S. Guy, "Cities, regions and privatised utilities," *Prog Plann*, vol. 51, no. 2, pp. 91–165, 1999, doi: https://doi.org/10.1016/S0305-9006(98)00028-2.

[17] R. Stolt and U. Winblad, "Social Science & Medicine Mechanisms behind privatization : A case study of private growth in Swedish elderly care," *Soc Sci Med*, vol. 68, no. 5, pp. 903–911, 2009, doi: 10.1016/j.socscimed.2008.12.011.

[18] A. D. Nasution and W. Zahrah, "Public Open Space Privatization and Quality of Life , Case Study Merdeka Square Medan," *Procedia Soc Behav Sci*, vol. 36, no. June 2011, pp. 466–475, 2012, doi: 10.1016/j.sbspro.2012.03.051.

[19] E. Purwanto, "Privatisasi Ruang Publik Dari Civic Centre Menjadi Central Business District (Belajar dari Kasus Kawasan Simpang Lima Semarang)," *Tata Loka*, vol. 16, no. 3, pp. 153–167, 2014.

[20] M. Jin, L. Gong, Y. Cao, P. Zhang, Y. Gong, and Y. Liu, "Computers, Environment and Urban Systems Identifying borders of activity spaces and quantifying border effects on intra-urban travel through spatial interaction network," *Comput Environ Urban Syst*, vol. 87, no. October 2020, p. 101625, 2021, doi: 10.1016/j.compenvurbsys.2021.101625.

[21] D. Sibley, "The problematic nature of exclusion," *Geoforum*, vol. 29, no. 2, pp. 119–121, 1998, doi: https://doi.org/10.1016/S0016-7185(98)00002-5.

[22] T. A. Markus and D. Cameron, *The Words Between the Spaces*. London: Routledge, 2002.

[23] R. G. Cano, C. C. de Souza, and P. J. de Rezende, "Solving dynamic labeling problems to optimality using solution space reductions," *Theor Comput Sci*, vol. 789, pp. 77–92, 2019, doi: 10.1016/j.tcs.2018.08.010.

[24] A. Madanipour, *Design of urban space : an inquiry into a socio-spatial process*. New York: Wiley, 1996.

[25] H. Lefebvre, *The Production of Space*. United Kingdom: Blackwell, 1991.