

Coexistence of informal hybrid space in the development of Jatinegara station area in East Jakarta

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received May 17, 2024 Received in revised form June 16, 2024 Accepted August 20, 2024 Available online December 01, 2024</p> <p><i>Keywords:</i> Coexistence Density Hybrid Informal Space syntax</p> <p>*Corresponding author: Tri Endangsih Department of Architecture, Faculty of Engineering, Universitas Budi Luhur, Indonesia Email: tri.endangsih@budiluhur.ac.id ORCID: https://orcid.org/0000-0002-8569-4237</p>	<p><i>The phenomenon of rapid increase in urban population has triggered spatial densification. By taking a densely populated area in the Jatinegara station transit area, this research tries to explore the typology of density patterns in residential areas and public buildings. The use of space and the spatial pattern of cohabitation between the informal sector and urban space are investigated in this study. Participatory design, space syntax simulation, and space use pattern observation are the methods employed in this study to address the case. The findings indicate that inserting, pasting, and stretching are the three types of compactions. Settlements, public buildings, and pedestrian spaces all experience hybrid forms of compaction. The results demonstrate that the cohabitation of hybrid spaces is negotiated, and spatial, and results in synergistic governance. The three categories of hybrid coexisting spaces are defined as informal places that coexist with formal spaces through hybridization. From the results of spatial observation and perception mapping in the process of densification, the research produced recommendations in a guided participatory workshop. This research is expected to contribute to the concept of overcoming architectural design problems of density in framing public space.</i></p>

Introduction

More than half of the global population currently lives in urban areas due to the search for benefits and opportunities, especially for better jobs and facilities. The United Nations (UN) projects that by 2050, about 66% of the world's population will live in urban areas (Kementrian PUPR 2017). This can be attributed to the explosion of urbanization that occurred in the 21st century, which in consequence affected the modern, individualistic character of society. Rapid urbanization affects not merely the nature and way of life of a community but also overpopulation in urban areas and the inability of those areas to provide for the needs of their inhabitants (Rahman and Alam 2021; Yusoff 2019). If population growth is uncontrolled, then the need for urban population facilities will also

increase such as connecting infrastructure, shopping areas, business areas, educational areas, and others.

Regenerating the city is one of the initiatives that aims to enhance its quality. According to research by R. Funsho Simon, A.K. Adegoke, and B.A. Adewale (2013), urban regeneration is defined as the revitalization of depressed urban areas through initiatives like 1) historic area rehabilitation; 2) residential area living conditions improvement; 3) public space reconstruction, including parks and city furniture; and 4) modern urban infrastructure, including water, gas, electricity, and transportation networks. Berry Ed explains that urban regeneration is a process or cycle starting from growth, decline, recovery, and sustainability, this process is so complex, especially requiring a long time and large costs for



regeneration to occur (Berry, Deddis, and McGreal 2013).

Urbanization in general terms is the movement of rural communities to urban areas. The current understanding of urbanization is not only seen as a change of place but a multi-sector shift in culture, social lifestyle, economy, and urban lifestyle and mobility (Prakasa and Suko Istijanto 2017; Yusoff 2019). The character of informal space is a 'space organization system' whose spatial utilization behavior must be mapped and integrated harmoniously into the urban space system (Habracken 1998; Naceur 2013; Kamalipour 2016). In the context of urbanization that occurs in East Jakarta, it is believed that there is a slight difference with the general theory of urbanization so that this research is urgently needed.

This study is being conducted in the East Jakarta Jatinegara station area. The area has the potential to be developed because it has an expanded station building and a double-track construction line. Furthermore, the 2014 DKI Jakarta Spatial Planning Detail Plan states that the area will be developed using the Transit Oriented Development concept. The growth of urban livelihoods, which typically leads to a divide between the formal and informal sectors, is what contributes to the informal sector (Zhu and Simarmata 2015). From a different perspective, the informal sector is not only seen as a form of diversity but also as a harmonious relationship that it creates (Kamalipour 2016; Lombard 2014; Widodo et al. 2015).

This research aims to investigate and identify different types of spatial cohabitation. The study's contributions include advancing our understanding of the phenomenon of informal urban space and endorsing the idea of coexisting informal hybrid spaces in high-density, high-function locations. According to the idea of high-density places, the outcomes of this advice may be implemented as a compact, inclusive, and sustainable urban space design that could provide more connected and integrated spatial and regional solutions.

There are two components to comprehending informality: procedure and outcome. Several crucial elements are present in the informality process, including social contact, appropriation, adaptability, self-organization, and incremental development. On the other hand, hybrid, road network, human scale, mixed usage, territorial ambiguity, connectivity, and formal variation are

the results of informality. In general, all of these discuss planning, architecture, and urban design, both tangible and intangible (Stark, Riordan, and O'Connor 2011). The informal sector is a collection of various economic activities that are generally not formally registered by the government and are not taxed (Babbitt, Brown, and Mazaheri 2015; Rosmarin and James Connor 2016; Braquinho et al. 2015; Rothenberg et al. 2016). Coexistence between the formal and informal sectors is a common phenomenon in developing countries (Zhu and Simarmata 2015). The characteristics of the informal sector are small business units, professionally skilled workers, low wages, and government regulations (Yuki 2007). The spatial morphology of the informal sector is frequently not in line with formal development patterns (Dovey and King 2011). Informal settlements are complex adaptive assemblages because their contents are unpredictable, dynamic, and non-linear (Alzamil 2018; Dovey and King 2011; Kamalipour 2016). Informalitas dalam permukiman terjadi akibat the implementation of cooperation between each shelter system in a systemic relationship between residence, work, and access (Budi Prayitno 2016). Informal settlements are more than just an uncertain form of urban development, as is commonly thought (Samper, Catalina Ortiz, and Javier Soto 2016). The activities carried out cannot be separated from the workplace, therefore the mobility space created in a formal settlement is also greatly influenced by its informal characteristics (B. Prayitno 2017). This is due to the nature of the use of space which is very flexible, negotiable, and shared. This concept of sharing also occurs when there is a combination of space and building functions in sub-districts in Indonesia (Budi Prayitno 2016; Liem, Liem, and Prayitno 2020).

The process of urbanization that leads to the informality in the usage of informal space has produced a new configuration of urban space that is hybrid and informal at the same time. This is because the definition of the objective and application of space has changed. Consequently, the plurality hybrid space typology provided development to multiple hybrid space typologies (Cho, Trivic, and Nasution 2015). There are three basic types of hybrids and their combinations: fabric hybrid, graft hybrid, and monolith hybrid (Fenton 1985) fabric hybrid is a form of volumetric filler in a spatial system in the form of a grid network, while graft hybrid is a form of grid

network. a collection of various functional building masses in one block. Monolith hybrid on the other hand is a variety of functions in a monolithic mass and space that are bonded by building a skin.

Space syntax simulation describes linear and nodal space description methods. The first method consists of analyzing axial maps and linear maps, based on visual observation (Bill Hillier 1996). Axial line analysis takes into account important aspects of the overall building structure, but not the shortest and longest ideal lines (B Hillier et al. 1993).

The theoretical framework presented above indicates that cities in all sectors have both advantages and disadvantages in hyper-urban environments. The sustainability of a city now typically depends on integration, compactness, and well-thought-out spatial planning. In this particular case, the way the idea of urban sustainability is formulated will undoubtedly change depending on the area. This notion is to be implemented in the context of its location; an empirical investigation of the informal sector is required.

Methods

The research paradigm used in this research is rationalistic with an ontological research view (Creswell 1994; Walters and Linda Brown 2004). Case studies are used as a methodological basis because the phenomenon that occurred in East Jakarta is a unique case and can further explain why and how this condition of coexistence can

occur (Hollweck 2015; Johansson 2003). The research method used is a case study with the criteria of diversity and uniqueness of typology for understanding informal hybrid space through visual observation, spatial typology, axial map mapping through spatial syntax simulation, and perception exploration through guided participatory design workshops. The relationship between the mix of functions, accessibility, building density, intensity of the surrounding environment, and public and private relations are important indicators for understanding the morphology of the informal sector on a more detailed scale (Kamalipour 2016).

In this study, the first stage is to conduct a theoretical study related to hybrid principles for regional planning, hybrid principles for building forms, and station area development theory. The extent of formal and informal settlements, as well as a theory on the syntax of urban space, are theoretically investigated in addition to the hybrid theory. To develop hybrid concepts and criteria that might be applied to the region and buildings, a theoretical study was conducted. In this study, observation and interviews were the methods employed to obtain data. The second stage will involve making observations of the field's current conditions to identify any gaps or contradictions between the hybrid theory's principles and the circumstances currently in place in the Jatinegara station region. As part of this observation, questionnaires on the opinions of locals surrounding Jatinegara station were distributed to conduct an assessment in addition to observing the current conditions. The following image explains the stages of the study:

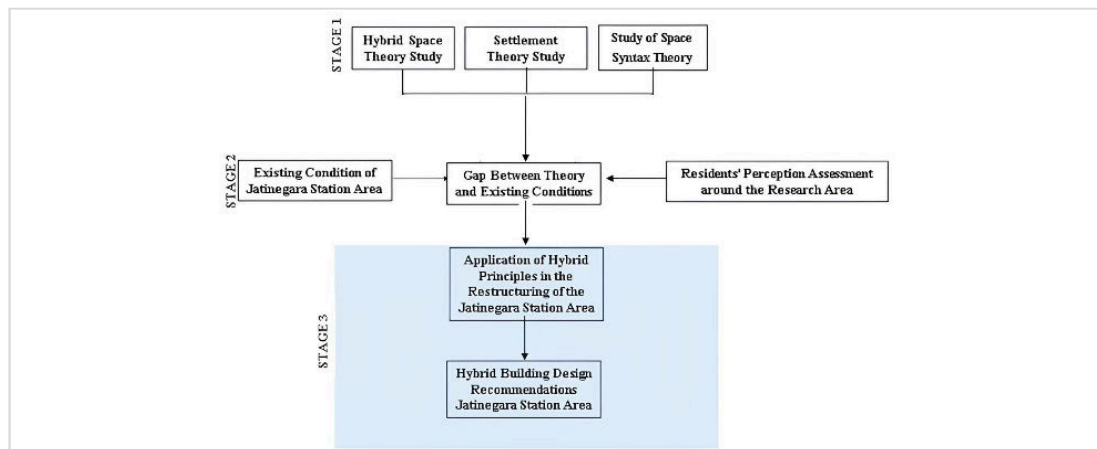


Figure 1. Research stages

The 3rd stage is to analyze existing conditions to obtain findings that will be discussed by applying the hybrid concept. The variables of this study are 1) a combination of programs/functions (parameters of functional diversity and accessibility; scale of functions and activities, integration of functions, and intensity of use); 2) accessibility (availability of pedestrian paths, types and forms of circulation path configurations, ease of accessing circulation paths, comfort of circulation path users, movement patterns, availability of connection spaces between functions); connectivity (spatial connectivity); and spatial integration (Integration of circulation spaces and open spaces). After conducting the analysis, the next step is to compile a hybrid settlement design concept by applying the hybrid principles that have been discussed in the theoretical study.

Results and discussion

1. Hybrid compaction pattern

The spatial changes that have densified the area around Jatinegara Station have been going on for decades. This condition can be described by the morphology of the area which tends to be compact from a spatial context and the growth of networks (alleys). This spatial change is caused by the increasing urbanization of the commercial sector. The three main generators behind this densification are Jatinegara Station and the surrounding market. The existence of these generators gives rise to the need for services such as street vendors, parking lots, kiosks, food stalls, drinking stalls, and other services. All service and commercial sectors are generally medium to small scale. These two types of densifications generally grow due to the presence of the informal sector in economic services which have an impact on the informal sector spatially.

Based on the points of informal sector density, two patterns emerge, namely the density pattern in residential areas, markets, and stations, and the density pattern on the road. Both of these are the dominant patterns found in the field.



Figure 2. Wall attachment patterns in formal housing

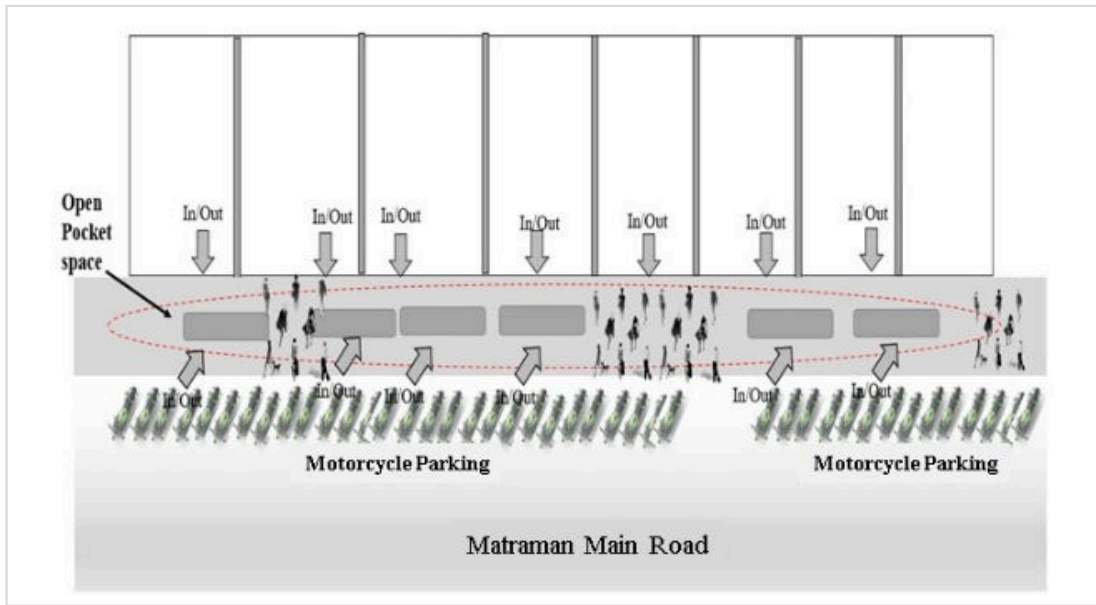


Figure 3. Spatial densification in Jatinegara and surrounding areas

The housing density pattern that occurs between the backyards of formal housing and the backyards of informal housing occurs due to the increasing variability of functions (dense functions) and the increasing intensity of station activities which in turn creates the need for training rooms, housing for employees (in the form of flats/rentals), which results in

increasingly dense stations. housing (an extension of formal and informal housing. The increasing intensity of activities in the surrounding markets and shops has resulted in expansion towards the main road, coupled with the intense activity of the station itself which has also expanded to the east to create parking spaces.

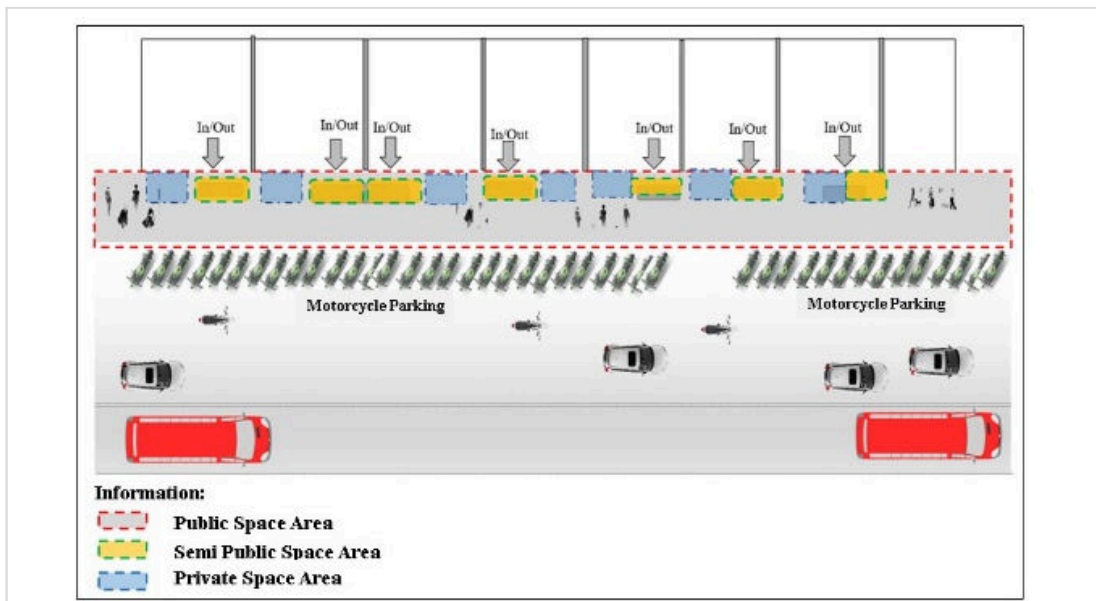


Figure 4. Densification pattern of insertion system in formal housing

The observation data reveal three themes of spatial compaction: expansion, attachment, and insertion, which are practiced by new immigrants and inhabitants. The existence of economic drivers and movement centers like trains and marketplaces nearby frequently contributes to the development of the three densification themes. Food vendors and grocery stores are inserted into informal areas to provide the densification insertion that requires a place in open spaces and pocket spaces between unauthorized residences and schools (public amenities). Rentable houses are inserted within informal locations to create open spaces and pocket spaces between formal and informal housing.

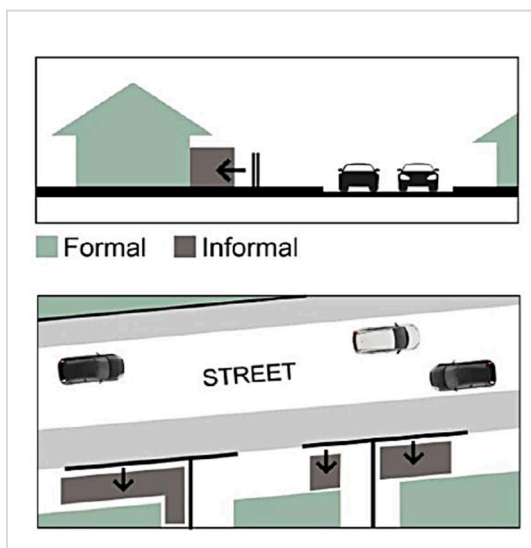


Figure 5. Income patterns in formal housing

The second compaction process is the attachment that occurs in the space outside the schoolyard located behind informal housing occupied by rented houses. There is also a spatial pattern formed by the attachment of food stalls, grocery stores, and motorcycle taxi stands to the space outside the official housing of the train station.

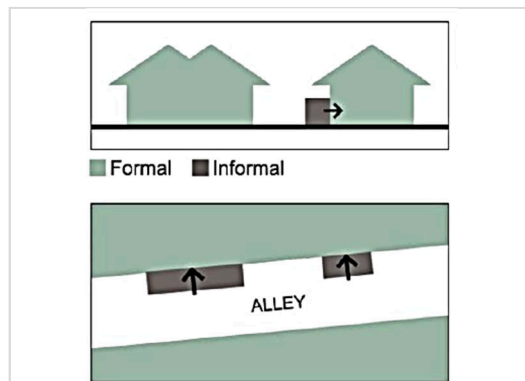


Figure 6. Wall attachment patterns in formal housing

The third type is the process of expansion compaction that occurs in formal and informal housing yards that are expanded for housing and business functions (food stalls or kiosks). Then there is also a phenomenon of space expansion in station buildings that expand to the east and are followed by the expansion of informal activities (parking, stalls, and kiosks). This process also occurs in market buildings that compact the space so that it expands informally to the north and east sides of the road, causing road space compaction.



Figure 7. Market development expansion pattern

These three densification processes cause dense informal housing spaces to move towards formal housing, from the direction of the Mester market to formal housing in the Rawa Bunga sub-district area, which ultimately connects the market to the station. In addition, spaces within the area are becoming more densely populated and experiencing increased functions. This results in dense spatial connectivity due to the narrowing of road space due to the process of compaction of insertion, expansion, and attachment of various activity spaces.

2. Perception of informal space use

There are three perceptions found from observations of space utilization behavior and reading perceptions through questionnaires answered by affiliated users and agencies/stakeholders. First, migrant communities engaged in the informal sector in the area generally prioritize rental costs and rental periods as important factors for them to live in the area. For the informal sector, the process of connecting informal spaces to the station and market areas also heavily depends on how close the place is to the hub of activity. Second, it is

believed that the primary variables in controlling the region are transportation and building use from the viewpoint of city officials and railway officers. Because they are seen as fundamental to governance, land use, environmental considerations, and building form factors are thought to have no bearing on governance. Third, from the perspective of the space utilization agency, the two primary criteria deemed most significant for the future development of the station and market areas are collaboration and conflict management.

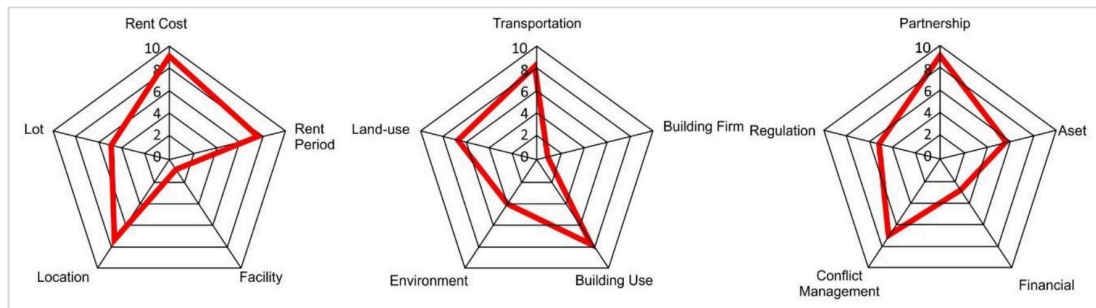


Figure 8. Perception diagram

From the three perceptions above, it can be formulated that joint partnerships and synergistic management are the main factors in the coexistence of informal hybrid spaces. The existence of co-spatial is based on factors such as location, transportation, and building use. The existence of governance is based on factors such as partnerships, rental costs, rental periods, and building use. Both concepts can be implemented in a hybrid model approach to compact and synergistic buildings and areas.

3. Connectivity and space integration

Syntax analysis of network connections shows that connectivity with global space integration (HH) has an R2 value of 0.4 while connectivity

with local integration (h3) has an R2 value of 0.8. From the comparison of these values, the strongest relationship is the relationship between neighbors. The relationship between residential units tends to be very close because the space is formed from the results of social communication. Street space is a private space between houses and turns into a public space due to the densification and addition of residential units (houses).

Connectivity analysis is a static local measurement analysis and takes into account all direct connections that each road has to other roads around it. Connectivity is applied to explain the number of connections that each road has to the roads that are connected. The results of the axial mapping analysis are as follows:

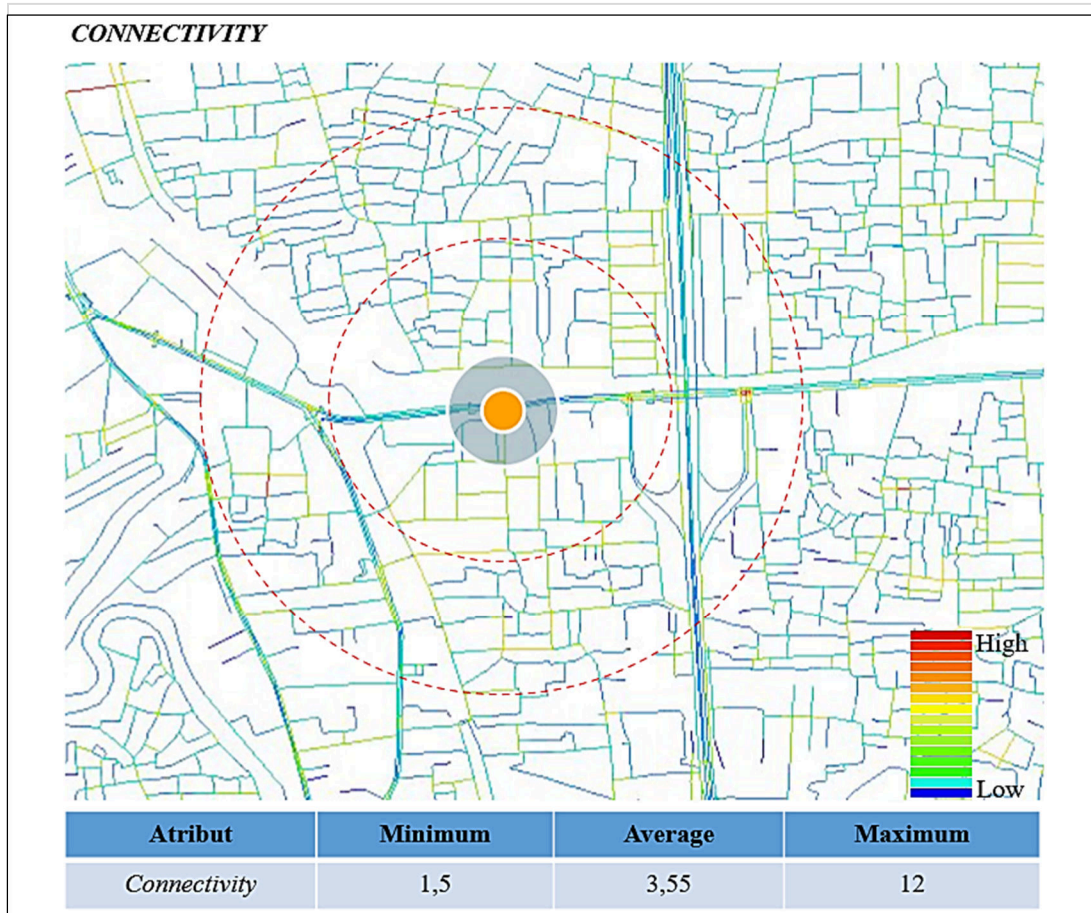


Figure 9. Connectivity map in Jatinegara

Based on a graphical study of the current axial site map, figure 9 displays the average global connectivity value of the site location, which is 3.55. In the meanwhile, the graphical analysis of the axial map above indicates that the minimum value of global connectivity is 1.5, and the greatest value is 12. The intended category is determined by converting the category determination scale, which is also used in the assessment stage of the space in figure 9 above. The average value for global connectivity from the results of the graphical analysis above depends on the "low" category. From the results of the connectivity assessment with space syntax, Jatinegara station is located in a location with a low connectivity value (seen in the blue

indicator), this is because the access routes are mostly separate, and enter small alleys. The residential area around the attractor has a spatial connection system that is highly integrated.

Integration Analysis is a spatial configuration analysis that can assess the ease of reaching a particular space. Spaces that are easy to reach have a higher access connectivity value. While spaces that are difficult to reach have a lower access connectivity value. This integration analysis can later estimate the level of road accessibility to all other roads in the urban system by considering the total number of changes in the direction of urban entities (Bill Hillier 1996). The results of the axial mapping analysis are as follows:

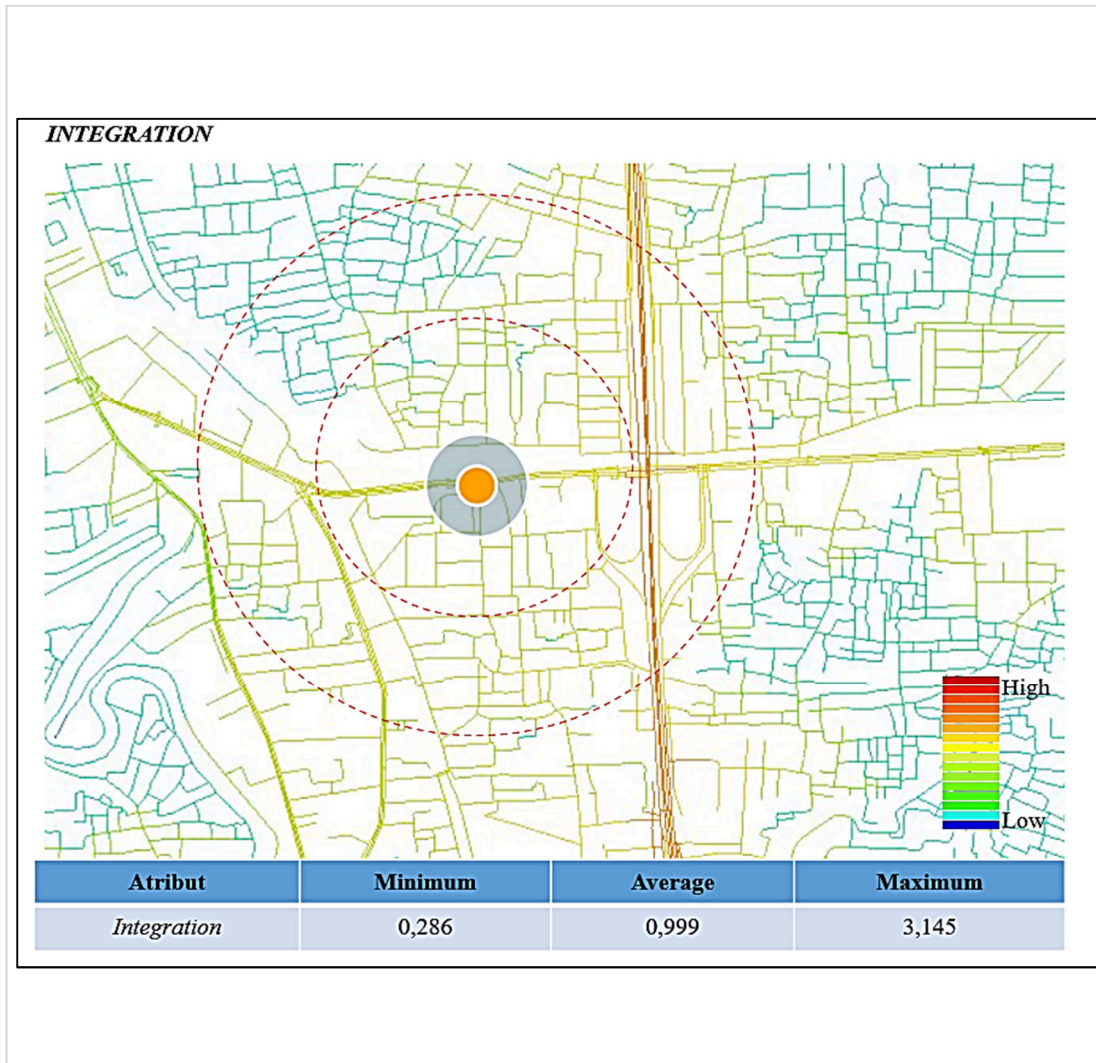


Figure 10. Integration map in Jatinegara

The location of Jatinegara Station has a moderate integration value, as evidenced by the results of the integration analysis utilizing space syntax in figure 10. This demonstrates how simple it is to navigate from every other space to the station position. This integration value is examined, nonetheless, and still needs development. It is widely acknowledged that there are informal sector groups with significant local integration in the area's connectivity and accessibility system, particularly in the vicinity of the train station and market. Local integration is an essential result in this discipline. Local accessibility can serve as a foundation for future space integration development, especially in the context of vertical construction development. A

region can be considered as possessing good accessibility and being easily accessible if the spatial syntax's integration and connectedness are significant. Because the area encompasses prospective attractions and destinations, its excellent accessibility might be regarded as the ideal location for social amenities. This is delivered on by confined spaces and improperly designed sidewalks that serve commercial purposes.

Intelligibility analysis (clarity value) is the relationship between connectivity and integration. A space will be easier to recognize if it has a strong relationship between the two variables. The results of the intelligibility analysis are as follows:

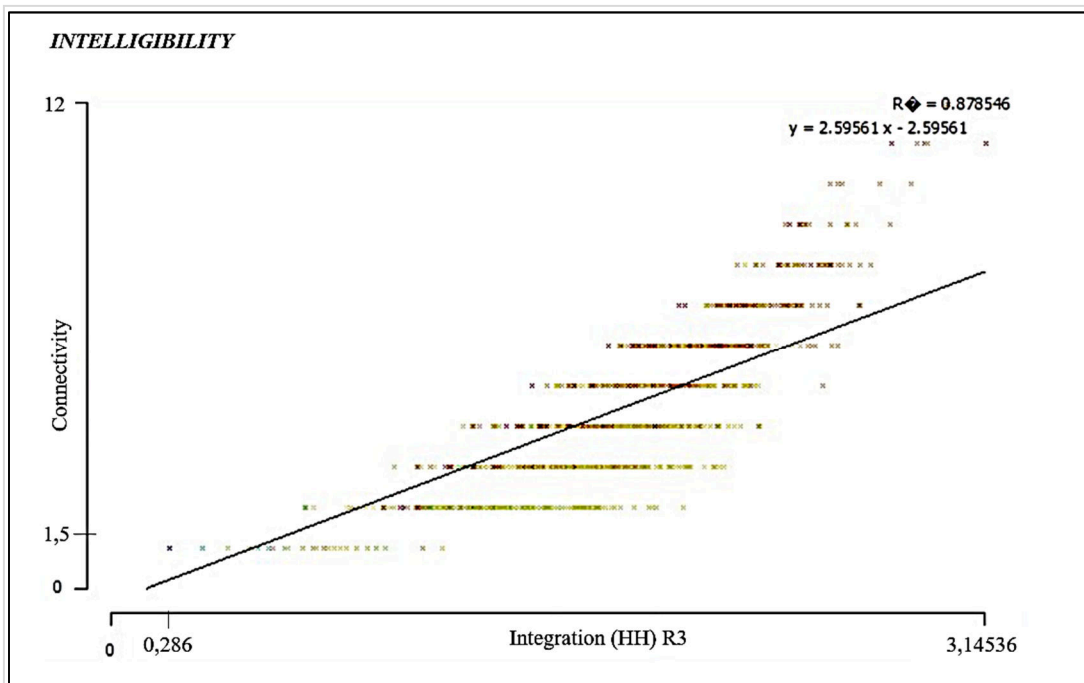


Figure 11. Scatter intelligibility diagram of Jatinegara station area

Figure 11 illustrates the intelligibility value or clarity of road space obtained by comparing the connectivity value and integration of road space at a radius of 3 (three) or local scale. Additionally, it is evident from this scatter plot diagram that the global intelligibility, or correlation value (R), is 0.878546. It can be concluded that the spatial arrangement of the Jatinegara station area is simple for locals and users to understand with an intelligibility value of more than 0.5. With the reference that the range of 0 to 1 represents the maximum value for spatial clarity, it can be inferred from this value that the structure of this region generally has excellent spatial clarity. The Jatinegara station area has moderate integrity, high intelligibility, and low connection, according to the results of the analysis using space syntax. Adding road segments, bridges, and flyovers are certain methods that attempt to increase these values. The addition of new roads tries to connect each block with a maximum limit of 150 meters. This is related to the theory that the higher the density of road intersections concerning land area, the better the level of walkability (Tiara, Ikaputra, and Dyah Titisari Widyastuti 2017). The relationship between residential units tends to be very close because the space is formed from the results of social communication. The street space is a private space between houses and turns into a

public space due to the densification and addition of residential units (houses). In general, the partnership is mediocre. This is because the area's attractions, which include a market and an elevated train station both examples of urban infrastructure make it appealing. Settlement development is significantly impacted by both of these attractions. Strong integration value is possessed by the settlement network. Although it has its system of spatial connectivity, the residential area surrounding the attraction is nevertheless closely connected with the contractor. Accessibility has a direct relationship with integration value. High accessibility values will encourage people to relocate into or out of the area. The many conflicts over the use of roads between pedestrians and motorized vehicles cause mobility routes to be disrupted. This is due to the limited width of the road and the non-functioning sidewalks.

The research findings show that the local integration value is very strong, and overall does not provide a significant increase in value to general conditions. In the regional connection and accessibility system, it is known that there are informal sector groups with strong local integration, especially around the Mester market and Jatinegara station. Local integration is an important output in this area. Local accessibility

can be a foundation for the development of spatial integration in the future, especially for vertical settlement development. Based on the findings of this study, the idea that underlies the coexistence of unauthorized urban areas in the vicinity of the Jatinegara railway station is the high social value of negotiated transactions and mutual synergy. Thus, a process of coexistence between formal and informal spaces must be implemented, particularly in intensive settlements (intensified settlements), in the form of hybrid multi-story spaces and buildings, and circulation must be intensified through the implementation of cross-level, multi-story mobility that is functionally connected. Low-rise settlements (low-rise terraced houses and apartments) are advised for congested areas. It is advised that markets and stations establish hybrid functions between homes and markets, as well as between housing and stations, for densely populated public facility places. For dense roads, multi-level mobility such as roads and pedestrian sidewalks that function across the sky is recommended. This is following the hybrid building theory which contains three important types in terms of its development scale; fabric hybrid, graft hybrid, and monolith hybrid

(Fenton 1985). However, in this case study, there are only two behaviors of space use in forming a hybrid building, namely fabric hybrid and graft hybrid. Both patterns of hybrid space use are the basis for the development of the hybrid space concept in the Jatinegara area.

The recommendations for integrated regional development concepts between the informal and formal sectors are arranged in three alternative development concepts. The three alternative concepts are Hybrid Transit Development (HTD); Hybrid Occidented Development (HOD); and Hybrid Occidented - Transit Development (HOTD).

1. Hybrid Transit Development (HTD), a combination of commercial and residential functions in one building, such as combining similar activity motifs. Habraken (2000) mentions trade and services. For example, a combination of stations, transit stops, flats, and public spaces or a combination of stations, commercial, flats, and public spaces. The selection of alternative combinations of these functions is based on the buildings that have the most potential to be combined at the nodal point location in the form of a station.

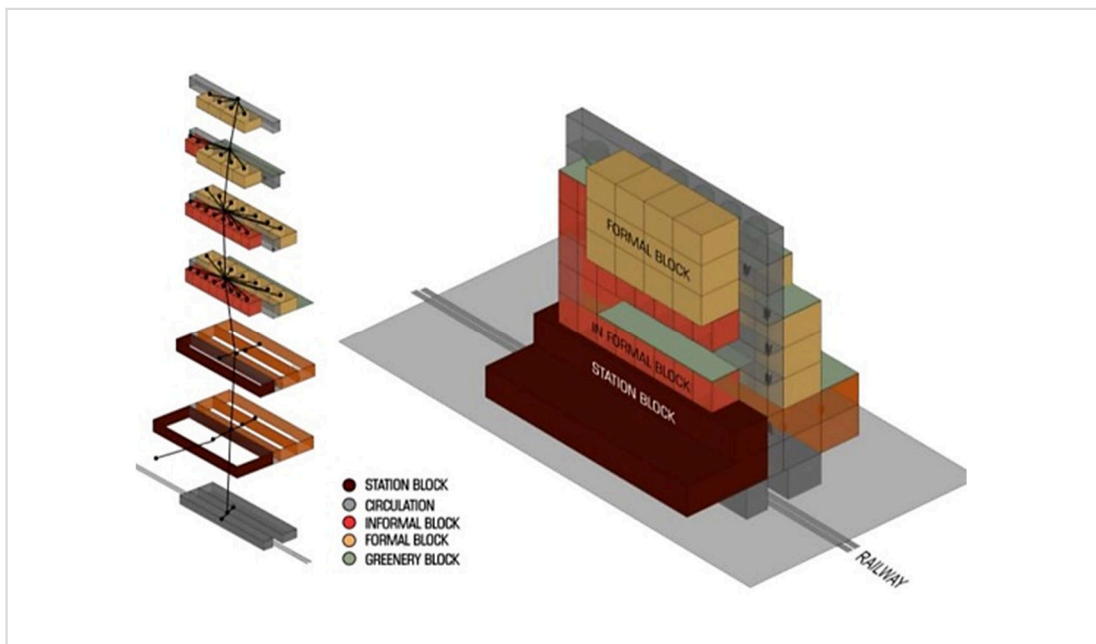


Figure 12. Hybrid building design recommendations with hybrid transit development typology

2. Hybrid Occupied Development (HOD), is a combination of existing housing with supporting environmental facilities such as

playgrounds in parks, open spaces, and others. This combination is based on similar motives such as social values and cultural values.

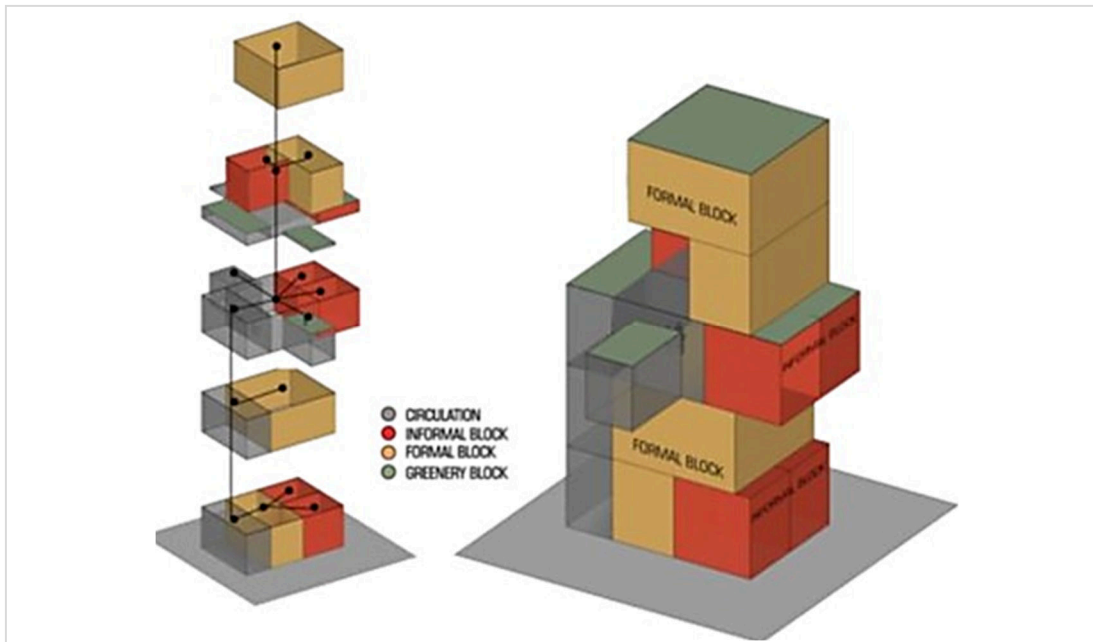


Figure 13. Hybrid building design recommendations with typology Hybrid Occidented Development (HOD)

2. Hybrid Occidented - Transit Development (HOTD), is a concept that combines two previously combined concepts, between commercial and residential, local and new

values. This concept can overcome high-density city situations without losing local character and social or cultural values.

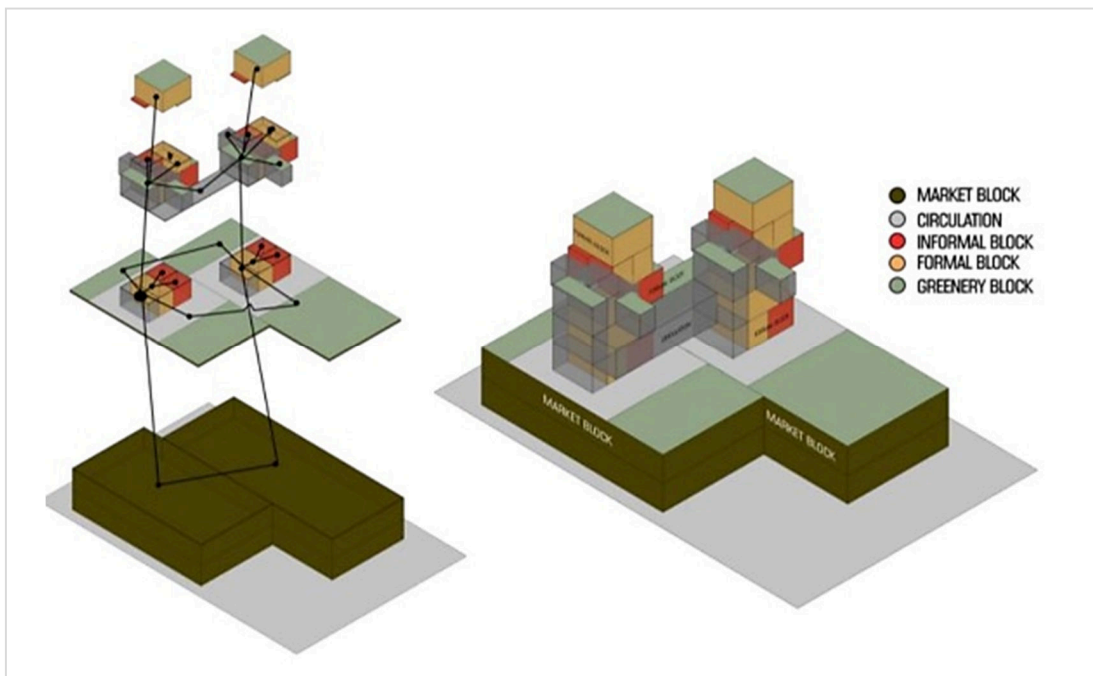


Figure 14. Hybrid building design recommendations with typology Hybrid Occidented-Transit Development (HOTD)

Conclusions

As the study's conclusion reveals, official and informal areas may collaborate to create autonomously organized hybrid coexistence. However, because this process happens quickly and without any planning, the local government is unable to monitor it. In addition to creating congestion, road densification also results in the loss of open space due to housing environment densification. Problems in the domestic setting

will undoubtedly result from this. Understanding changes in the urban environment requires a change process that involves self-organization and gradual adaptation.

The coexistence of the informal sector is present and lives side by side with the formal sector if the social and cultural order of society is in a mutually synergistic synergy. The following image explains the concept of coexistence of the formal and informal sectors in one building period or in one area.

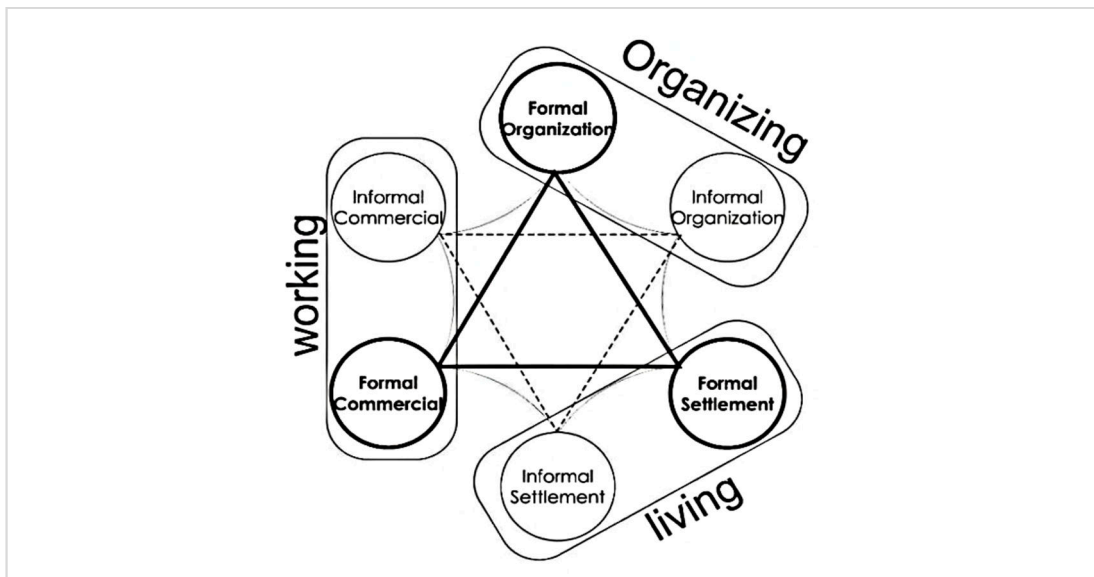


Figure 15. Informal sector coexistence concept diagram at Jatinegara station and surrounding areas

The existence of the informal sector with high density occurs due to the expansion and integration of space based on business/livelihood needs and population growth. Spatial integration on a local scale is a key parameter to measure the strength and weakness of social values spread in spatial integration on a global scale as a parameter to measure the high number of informal sector groups throughout the region.

The condition of the city with dense and unplanned mixed-use spaces should be transformed into intense hybrid spaces as an effort to integrate and hybridize urban areas to be more effective and efficient in the use of space, mobility, and connectivity. The synergy and coexistence of formal and informal spaces is a solution to overcome settlement problems in high-density urban areas.

On an urban scale, integrating hybrid buildings with transit-oriented infrastructure will reduce dependence on the use of private vehicles

and encourage the use of sustainable transportation. Three recommendations for hybrid building designs that combine formal and informal sectors show the possible direction of contemporary hybrid building development that can lead to dense, resource-efficient, and sustainable urban environments.

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Author(s) contribution

Tri Endangsih contributed to the research plan preparation, methodologies, literature review, visualization, data analysis, article drafting and revisions.

Hakim contributed to the field measurement, data analysis, article drafting, and visualization.

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