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Development of Mutualism Settlement Along the Railway Towards a Sustainable City

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Abstract

The existence and development contribution of a village influences a sustainable city. Sidorukun Village is in the Gresik sub-district, Gresik district is dominated by settlements and industrial areas. In the middle of the village there is Indro Station as a Local Train (Railway) station. Since the 1980s, this train line has stopped operating and will be active again in 2016 for containers and in 2021 as a passenger train line. The shift in the function of this station has an impact on the local environment, especially the settlements around the station. On the other hand, the condition of the village was not ready for empowerment to welcome the bustling station activities. Among them, business facilities for parking and small trade that have not been well organized, and there is no passenger waiting area. This study aims to determine the basic, supporting and settlement aspects of settlements adjoining the station socially and economically in a sustainable aspect. So that there are proposals for settlement concept designs that support station activities through the role of active cooperation between the community and parties involved in the development of sustainable cities. Literature studies and field observations are used to find solutions to this problem. In addition, field observations in case studies were carried out through a SWOT analysis. The result is a sustainable settlement concept with community participation, which is integrated through station support facilities managed by the surrounding community such as stalls, minibus stops for waiting, and parking lots through sustainable optimization of commercial land productivity.

Keywords: Community, Participation, Productivity, Settlement, Station, Sustainable.

1. Introduction

In developing countries like Indonesia, urbanization is still ongoing indicating the expansion of urban construction and its encroachment on aggregate green public space (Bower et al, 2019). Along with that process being a crucial part of city areas offers spaces for people to live and produce (Ayambire et al, 2019). Consolidation of the city area is usually composed of sub-urban land and semi-settlements whilst dispersedly distributed in the downtown. Hence, the mutualism application is the basic value that refers to relationships in cities society between needs, neighborhoods, and quality of living. In particular for urban settlement restructuring whereby cooperation and co-existence aspects among groups are the main drivers for the sustainable development of cities (De Guimarães et al, 2020).

Lately, studies of urban settlement restructuring have been a popular research topic, including both qualitative and quantitative analysis methods. For instance, Zhaowu et al (2018) studied spatial support for urban-rural development in plains and mountainous areas in a case in Shanghang county (China). Then, Mukherjee and Sen (2020) studied a restructuring of the Indian flagship urban project (Lavasa as an eco-city, Rajarhat as a green city, and Dholera as a smart city). Futhermore, Abdullah et al (2022) studied new urban development on the outskirts of the old settlement in Kota Bharu (Malaysia). And most recently and general, Debray et al (2023) studied a urban structure and develop a continuum of Intensity of Plannedness (IoP). According to these studies replacement of the old settlement with modern housing estate showed sustainability functions are stripped to merely economic growth in urban cities. Due to that, sustainability model of urban planning should respond to the challenges of the intangible factors such as local culture spirit of neighborliness to benefit humane socio-economic dimensions.

Restructuring urban areas becomes a compact city in regard to two contexts of sustainable criteria: reducing the environmental impact and optimizing the built environment based on the densities of the population (Rothman et al, 2021). This is more challenging, especially in cities of growth in developing countries.This is more challenging, especially in cities of growth in developing countries. In particular, a typical condition in Indonesia has--more excessive amounts of high-density spatial structures, and mixed-use facilities (Farjam and Motlaq, 2019). Under these circumstances, a series of lacks appears such as polluting emissions, buildings without parking spaces, and high phonic pollution.Erdogan et al (2020) studies identified valid factors in the railways' transportation environment responsible for the frequent pollution and increased rate of traffic jams in urban areas due to terrible movements flow.

In many countries, Transit-Oriented Development (TOD) is designed to perform to connect regions, promoting pedestrian activities and a low-carbon living environment as part of urban settlement restructuring to develop a compact city (Wikstrøm and Røe, 2022). TOD aims to provide the conurbation mutual benefit structure surrounding residents living near major stations and other amenities for better accessibility. In Indonesia, there are about 357 established TODs with nearly 134 sites in East Java (Hasibuan and Permana, 2022). However, there is a lack of knowledge, especially regarding the extent of the basic aspects, supporting aspects, and settlements located around the station socially and economically in terms of sustainable aspects. The purpose of this study is to examine the best strategies for active mutualism settlement through TOD sustainable design. The focus here is on the Sidorukun, Gresik industry zone in east java, where there is a growing interest among investors' planners, and policy makers to promote transit-oriented (Abraham, 2022).

2. Study Area Profile

The existence of development in a village has contributed to a sustainable city. Sidorukun Village is in the Gresik sub-district, Gresik district is dominated by settlements and industrial areas. Indro Station as a Local Train (Railway) station is in the center of the village and is undergoing changes. In the 1980s, the train line stopped operating because the circular track in the city of Gresik was no longer used and the decreasing intensity of using the train by people who had switched to other means of transportation. The station was then reactivated in 2016 for container and passenger trains in 2021 (Ibrahim, A.M. in Antaranews.com, 2021).

Changes in the function of this station have an impact on settlements around the station-

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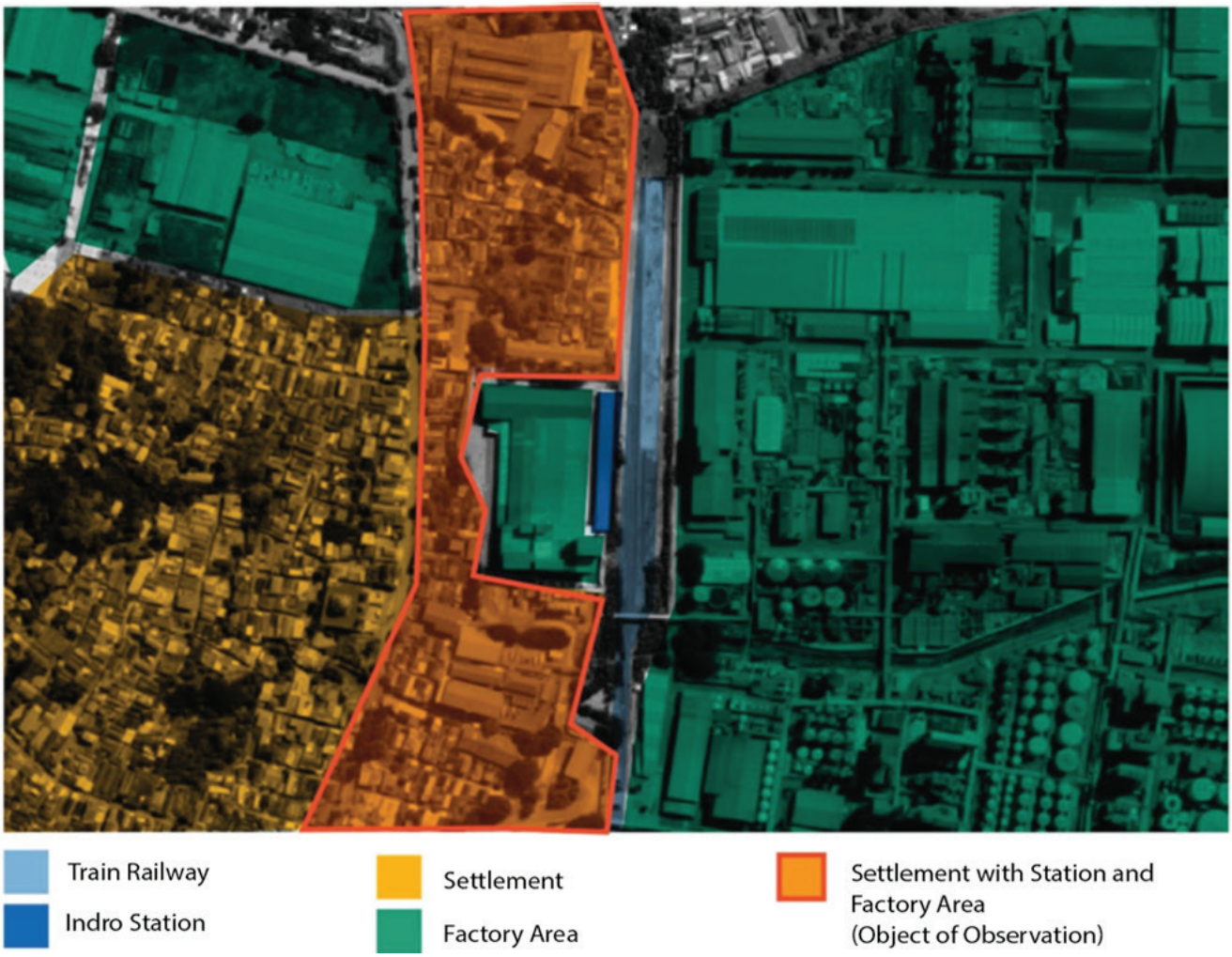


Figure 1. Residential of Sidorukun Village, Gresik District, Gresik Regency, East Java

-which experience interference from the crowd due to station activities. On the other hand, these settlements have not received empowerment in welcoming station activities which are starting to become active again. For example, small traders or stalls that have not been organized, parking business facilities are not good, and there is no waiting area for passengers. This settlement is surrounded by industrial areas, such as PT. Wilmar Nabati and PT. Etex Company. In the middle of the settlement there is Indro Station which is the focus of the problem. In Figure 1 present detail a map of the locations of the observed residential areas. The green zone is an industrial area, the blue zone is a station area, the yellow zone is a residential area, while the orange zone is the observed settlement.

Based on problems in the conditions of settlements and stations that are side by side and there is a shift in the function of the station, it is necessary to have a mutualistic performance-between the village and the station. Settlements that are located adjacent to the station, have a lot of potential in the community's economic field which is also able to support the activities of the station itself. Productive activity that can provide this mutualism relationship is the provision of new functions to settlements as a support for station activities. For example, there are houses that are used as stalls or places to sell, minibus stops on residential roads, and parking lots between settlements and stations that are directly managed by the residents of the settlements. These activities can create a mutually beneficial relationship between settlements and stations and contribute to sustainable urban development (Iskandar, 2020).

3. Method

3.1 Contextual Analysis

3.1.1 Sustainable Development

Inadequate settlements are a problem that is often-

-found in various regions in Indonesia and also in various countries in the world, so that it is one of the points in the SDGs (Sustainable Development Goals) (SDGs, 2022). The SDGs themselves are sustainable development efforts which are used as a reference in the development framework and negotiations of countries in the world. One of the SDGs points is to create a sustainable area and one of them can be stated in the field of sustainable cities and settlements (SDGs, 2021). Overall, the SDGs aim to improve human life in social, economic, environmental, and legal aspects (Iskandar, 2022). Based on the problem of unpreparedness interms of empowering these settlements and the initiative to take part in the success of the SDGs, developing settlements to create a mutual relationship with stations can be a solution to answer the question of SDGs point eleven.

Sustainable cities and communities are SDGs point eleven which makes cities and human settlements inclusive, safe, resilient, and sustainable. Where this point reviews access to affordable housing and basic infrastructure, especially slum areas, and access to safe, easily accessible, and sustainable transportation systems for all. These potential areas aim at upgrading, rebuilding, and developing green fields, environmentally sensitive development, as well as the relationship between infrastructure and urban land use and vulnerability assessment (Chatterji, 2020).

At this point eleven, there is a process of integrating SDGs goals into the national development policy agenda and regional development. There is Law no. 6 of 2014 concerning Villages which causes a paradigm shift in village development by empowering the village's potential in achieving the SDGs goals. Mainstreaming village development can contribute as much as 74 percent to the achievement of TPB (Sustainable Development Goals) so that Village SDGs become very important and urgent (Iskandar, 2020).

This sustainable pillar is inseparable from the role of infrastructure that supports human life. Infrastructure has standards that must be met to accommodate the needs of the surrounding community towards sustainable urban development. One of the existing infrastructures in the area is the station. According to PM 47 of 2014, minimum service standards at train stations include parking -lots, clear and easy-to-read information regarding-visuals and audio, passenger flyover facilities, counters, waiting rooms, boarding rooms, places of worship, breastfeeding rooms, toilets, facilities ease of getting on/off passengers, facilities for people with disabilities, health facilities and safety and security facilities (Menhub, 2014).

3.1.2 Participation Theory and Community Needs

The theory of public participation can be seen from two dimensions, one of which is the social dimension (Muhaimin, 1987). This dimension provides an overview of participation horizontally and vertically and is proposed on the aspect of the social dimension, such as:

- General patterns: community participation in the development of balanced governmental and non-governmental activities. Therefore, if there is a cooperative relationship between the two, it can be manifested as semi-governmental activities, so that participation from this pattern tends to increase.
- The dualistic pattern: community participation in non-governmental activities is higher than government-supported activities. In other words, non-governmental activities can more easily invite citizen participation than government supported activities. If this happens, then this is likely due to the activities of the government that are not managed properly.

This research is included in the dualistic pattern because it is not supported by the government. Therefore, it will be easier to invite community participation. The existence of several community groups that have initiated initiatives to provide support activities for the station, proves that there has been little movement from the community and only needs professional assistance. If community participation is given financial rights, education and empowerment will show the presence of the community (Ivett and Gillick, 2018). Therefore, financial support from other stakeholders can increase the enthusiasm of the community to participate.

The needs of the community are clearly visible from how a sense of belonging is instilled in the community naturally. Where an individual can realize his existence along with the concept of community as a physical relationship with an identified geographic area (Schutte, 2018).Through the sense of ownership that exists for each-

-individual in the Sidorukun Village community, the concept of participation can be realized together with professional assistance.

3.1.3 Empowerment and Participation

Community participation is a technical process that provides opportunities for people to participate and contribute to solving problems. Community participation is the basis for this activity. Where the purpose of this community participation is to find solutions that arise directly from the community so that the implementation of the results becomes more effective and sustainable. Community participation in architecture can take the form of a committee consisting of self-appointed members to join the development process (Marschall, 1998). In the book A ladder of citizen participation, it is explained that participation is defined as the redistribution of power from local residents who are currently not involved in political and economic processes, to be included in the future (Arnstein, S. in Devisch, et al. 2019).

Community participation is important because it can affect social change so that it can generate benefits for them (Arnstein, 1969). Participation is defined as the involvement of the thoughts and feelings of human groups that can encourage contributions within the group to achieve goals and take responsibility for what is desired. The following are three components related to participation, such as:

- Participation is a reality that involves more mental attachment and feelings than physical involvement.
- The desire to make a contribution to group goals. Where there is a feeling of initiative to help a group.
- Responsibility is an aspect that stands out when a person becomes a participant member in which there is a feeling of belonging in his mind.

In this study, the role of the community was taken to examine the problem from their point of view, ask for opinions on the proposed development concept, and invite them to give their opinion as a solution to the problem. The views of this community will be taken into consideration for the continuation of the development of settlements and stations.

3.2 SWOT Analysis

In search of solutions to this research problem,-literature reviews, field observations, and primary data collection were carried out. Field observations were carried out directly by researchers who were also participants (observer as participant). The researcher is a Commuter train user on the track being studied where he directly observed field conditions during two visits. Observations were made at the Indro station and the informal support space created unplanned by the Sidorukun village community.

The results of field observations and primary data collection obtained in the case studies were processed through a SWOT analysis. This analysis was carried out to find out the strengths and weaknesses of the village. In addition, to find out threats and opportunities from outside that cannot be controlled and must be faced. Then carry out further analysis through the SWOT matrix to produce strategies or steps that can be used to achieve the output concept of this research. The results of the SWOT matrix and literature review are conceptual outputs that can be applied to the issues raised.

4. Discussion and Result

4.1. Field Observation

Field observations were carried out to find out the problems that occurred at the location. Areas that coincide between settlements and stations are the focus of observation. Where there is almost no transition between the two, so that many activities influence each other between settlement and station activities. Many residential activities that coincide with the current station are initiatives from the settlement community, such as commercial activities with small businesses (warung) and parking lots. The following is the documentation and analysis of the field observation process.

4.1.1 Atmosphere of the Station Adjacent to Settlements

The following is the condition of the entry and exit points of the station which directly meet residential areas (Figure 2). You can see that many passengers from the train heading for the exit can see the settlements beside it.

4.1.2 Waiting Room Conditions from the Station

The waiting area provided by the station is only one small room with several seats in it (Figure 3).-

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Figure 2. Areas for entry and exit of Indro Station (above) and residential area (bottom)

-There is no waiting area provided by the station outside the station building.



Figure 3. The passenger waiting area provided by the station

4.1.3 Parking Area Conditions

When entering the station area adjacent to the settlement, there are two parking zones (Figure 4). The parking zone close to the station area is-a parking area for station staff. Meanwhile, the parking zone close to settlements is the parking zone for passengers. This parking area is provided by the local community.

4.1.4 Small Business Conditions (Warung)

After passing through the station attendant's parking area, passengers can see small businesses from the residential community, such as stalls (Figure 5). This stall is not only in demand by passengers, but also station staff who are taking a break from duty. This area has not been laid out properly and is still sober.

4.1.5 Conditions of Online Ojek Pick-up Points

After finding small businesses from the community, there is a simple drop zone which is directly carried out by the parking attendants fro the community (Figure 6). This drop zone is not only for dropping off passengers, but also the pickup point area for online motorcycle taxis. At the time of the train's arrival, many online motorcycle taxis-

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Figure 4. Parking space for passengers (up) and Parking area for station staff (down)



Figure 5. Community small businesses in the form of stalls as a commercial area of the surrounding community

-were already waiting to get passengers. In this area has not been laid out properly. There is no waiting area for passengers and no arrangements for online--motorcycle taxis. Currently, passengers waiting to be picked up are waiting on the terraces of residents' houses and taking shelter in trees of local residents.



Figure 6. The online motorcycle taxi pick-up point area

4.2 Analysis and SWOT Matrix

Analysis of the conditions of Sidorukun Village which was carried out through direct field--observations and through primary data studies was identified through a SWOT analysis as follows which is useful for knowing strategies that can be created or optimized. The grouping of internal conditions is focused on the local community, settlements and the station itself. External conditions are focused on the influence of station users, the Gresik government and stakeholders as well as external influences that play a role. From the studies that have been carried out, using the SWOT matrix is connected between the elements of Strength, Weakness, Opportunity, and Threat. So that a strategy is produced that can be an option for Strength-Opportunity (S-O), Weakness-Opportunity (W-O), Strength-Threat (S-T), and Weakness-Threat (W-T) solutions, the detail present in Figure 7.

4.3 Condition of Existing Station Facilities and Proposed Community Initiated Facilities

Based on the station facility standards submitted by the Ministry of Transportation, data were collected on the current condition of the facilities at Indro Station (Table 3). Through this data collection, it can be seen that the facilities that do not exist or are not good at the station, can become suggestions for initiation from the community. The following-

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Tabel 3. Table of Existing Indro Station Facility Conditions

Facilities Standard Based on the Minister of Transportation, 2014	Current Existence	Description of Current Conditions
Parking lot	✓	Not good
Clear, easy-to-read information on visuals and audio	✓	Already well
Passenger service facilities	✓	Become one with the counter
Counter	✓	Already well
The waiting room	✓	It's good, but small
boarding room	-	After check-in, passengers immediately enter the train, no need to wait
Worship place	✓	Small and not good
Nursing room	-	
Toilet	✓	Not good
Facility for getting on/off passengers	✓	A portable ladder
Disability facilities	-	
Medical facility	✓	First aid kit
Safety and security facilities	✓	Become one with the station attendant's room

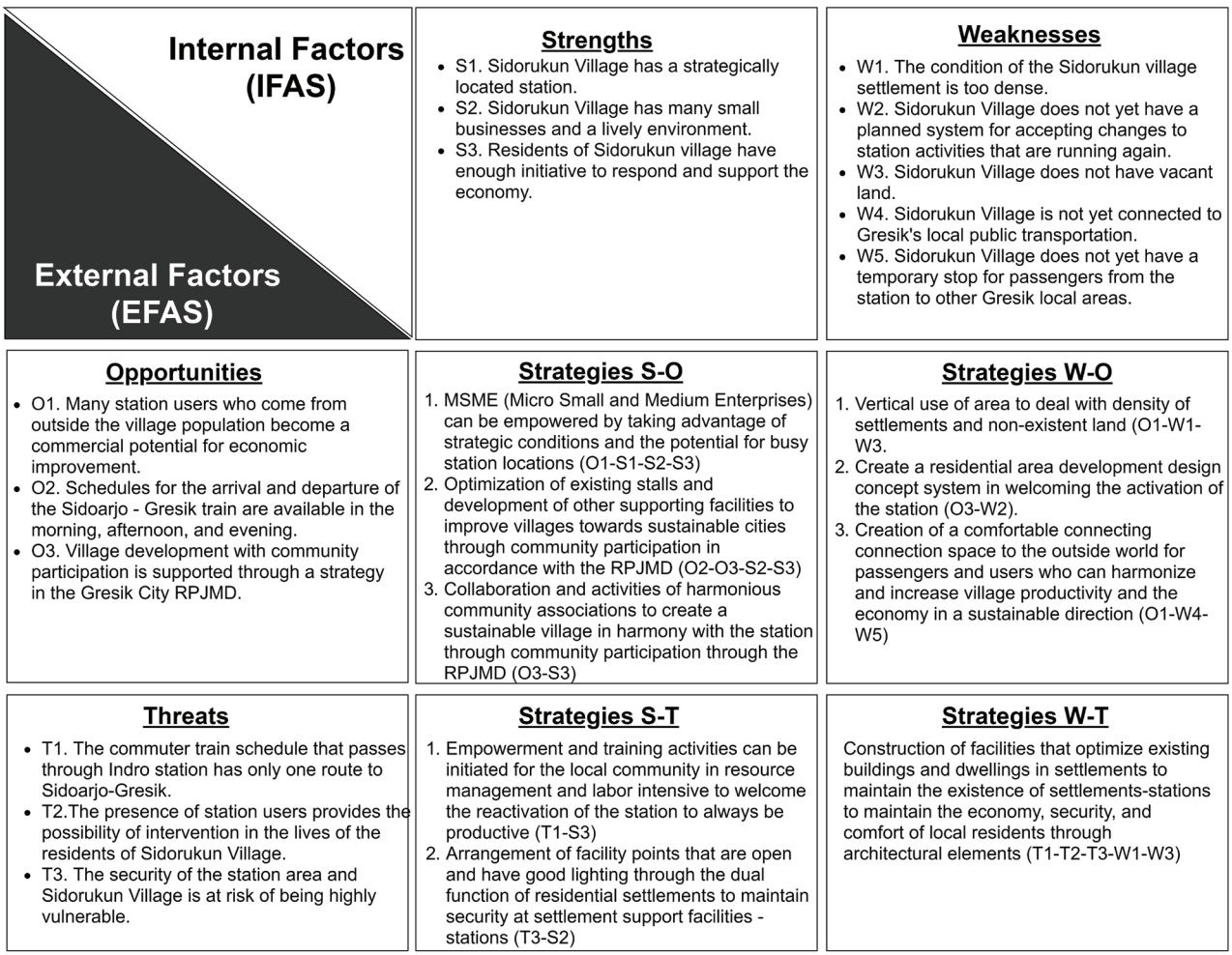


Figure 7. SWOT matrix analysis of Sidorukun Village, which is the location of the Indro station

-is a data collection on the current condition of the Indro Station facilities.

Some of the current Indro station facilities that are not good are parking lots, places of worship, and toilets. Meanwhile, the facilities that currently do not exist are boarding rooms, nursing mothers' rooms, and facilities for persons with disabilities. Based on the table above, facilities that can be accommodated by the community as a form of empowerment and cooperation are facilities that are classified as not good, such as parking lots, places of worship, and toilets.

4.4 Proposed Solution Idea Concept

Based on the problems obtained from field observations and SWOT analysis, several solutions were offered as a form of community participation. The solution to this concept idea will later be disseminated to the surrounding community and an aspiration network will be held so that their preferences can be known. Through professional assistance and other stakeholders, such as non governmental organizations, cooperation with BUMN, cooperation with online motorcycle taxis, etc. this idea can be realized. Some of the concept idea solutions offered are improving the convenience of commercial area facilities, improving the convenience of parking facilities, providing mini bus stops for waiting, places of worship, and toilets. The following is an overview of areas that can be added or improved through the settlement community empowerment program as a mutual relationship with the station (Figure 8).

Referring to the image of the current existing location (Figure 1), it can be seen the difference between the existing conditions and the proposed conditions (Figure 7). The proposed concept idea shows an area-colored yellow as an area that was added and did not exist before, namely a mini bus stop spot for a place to wait for an pickup. The reason for placing the minibus stop spots along the alley way is because there are a lot of activities of passengers waiting to pick up online motorcycle--taxis in that area. Along the way the alley is a way to enter and exit the station before entering the area within the station. So many passengers are waiting outside the area. The red and purple colors are areas that already exist in existing conditions but need to be improved to make them more feasible and orderly, namely the commercial area and the -parking lot area. As for places of worship, and toilets can be added to blend in with residents' homes. Due to the density of the surrounding settlements it is not possible to increase the mass of the building, so that it can be accommodated from community houses.

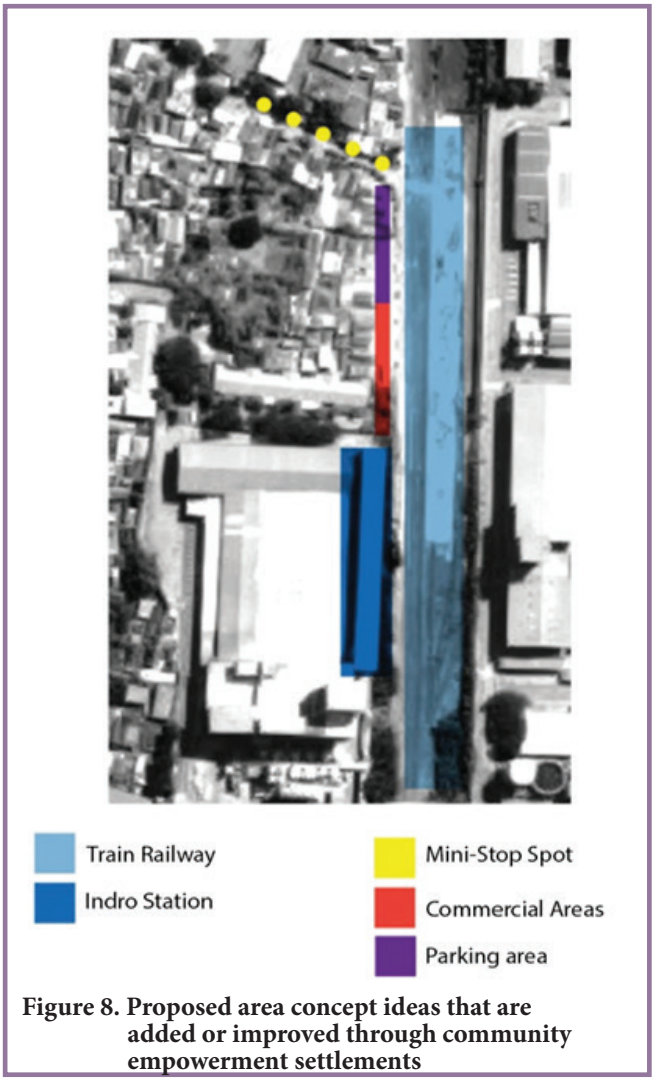


Figure 8. Proposed area concept ideas that are added or improved through community empowerment settlements

5. Conclusion

Sustainable urban development is of course also supported by the development of the villages within it. In Sidorukun Village, there is Indro Station which is starting to become active again. Inadequate village conditions require cooperation in community empowerment and stakeholders-related to community empowerment theory which can be carried out as an effort to realize the concept of sustainable settlements with community participation. In realizing the concept of sustainable settlements, Sidorukun Village renewed station support facilities such as stalls, mini bus stops for waiting, and parking lots through optimizing land productivity using community participation-

-methods to achieve sustainable development goals.

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