Housing and transportation system alignment-based on green concept

Imamah Khairunnisa^{1,*}, and *Shirly Wunas*¹

¹Hasanuddin University, Depart of Urban and Regional Planning, Gowa, Indonesia

Abstract. Land use and transportation system are the main components of the city space structure formation. Settlements as the biggest land allocation in the region play an important role in the availability of human resources and the largest generation of the city. Various problems arise along with the development of urban residential settlements, generally, occur in middle-scale cities to the larger cities i.e. development of middle-class house to elite-class that formed into gate. That fact was one of the causes of transport system problems, non-integrated in the transport system in housing area cannot be avoided. Therefore, this paper explains: 1) current condition of the house built by the developer (gated house) and the self-help house, 2) transportation systems that support the residential area, and 3) concept which supports housing and transportation system alignment in the context of green concept.

1 Introduction

The settlement is one of the largest components in the urban land use. According to the law No. 01 [1], explains that the purpose of organizing house is to supply the basic needs of the population, increased and equitable welfare population. Therefore, the settlement became very important in the quality improvement of a country's human resources.

The development of settlements land use was the most significant, primarily at medium-scale cities up to large-scale cities, even frequent the transition functions of productive farm-land becomes settlements. Problems occurred in the area of the settlement began to various, such as social problems, economic even environmental issues. This is particularly associated with the transport system. Settlement's issues that arose, one of that caused related to the development of middle-class settlement and elite class which was built following the pattern of the cul-de-sac then cause problems against the new road infrastructure alignment against previously existing access (local settlements).

Non-integrated road network infrastructure can give a negative impact on the community's economy and residential environment. Because according to the law No. 1

* Corresponding author: imamah.khairunisa@hotmail.com

[1], the purpose of housing and settlements are to ensure the realization livable and affordable house in a residential environment that is healthy, safe, harmonious, orderly, well-planned, integrated and sustainable. Settlements and transport are an absolute unity in a planning. The development of the area of the settlement should follow the road network infrastructure, so it will keep fit with the road network hierarchy [2]. Realization of settlement sustainable requires a plan that also embraced the concept of eco-friendly transport, as a base supporting the entire population mobility.

Study case focused on the Eastern Suburban area of Makassar City (Biringkanaya District and Tamalanrea District) which is one of the regions with the residential land use development was significant in the last 20 years (44%) [3].

Fig. 1. Eastern suburban area of Makassar City (Tamalanrea District and Biringkanaya District)

Analysis data obtained through the field observation by using the satellite map, generate data of thematic map such as the settlement land use development map and road network development map. Methods of analysis used in this discussion to be descriptive and comparative against policies/regulations. The preparation of the concept based on alignment analyses of the transportation system and housing settlements-based on the green concept.

Fig. 2. Framework

This Research aims to shows current condition of the house built by the developer (gated house) and the self-help house, to identify transportation system that support the residential area and to share about concept which supports housing and transportation system alignment in the green concept context.

2 Result and discussion

This chapter discusses regarding the analysis of the housing and settlement characteristics, an analysis of the transportation network development and transportation system alignment concept.

2.1 Analysis of housing and settlements characteristics

Real estate housing is the houses in an area developed by private parties as well as Government, while self-help housing is the housing that was established through the efforts of by the community itself. The main non-governmental homes built on land owned by the legal owners singly, while real estate housing is the houses that are built

above ground by private property developers. Residential streets per cluster in accordance with dimensions ownership/mastery of the land, so the types of homes and residential streets/cluster corresponding to developer's capability. This causes real estate tend to develop new settlement on the farm-small land that causes build a parapet with a cluster of houses of local residents who came to be called a community fenced or better known as gated community. The small cluster filled with new resident and often separate with local residents who earlier lived in the neighborhood (Fig. 3).

Fig. 3. Suburb settlements area map, Makassar City

Gated community housing generally followed the cul-de-sac pattern, where houses are built, not linearly and did not have connectivity with another good road network inside the gated community or outside their communities (local housing).

The development of residential land use in the suburban area, Makassar City (Tamalanrea District and Biringkanaya District) from 2003 till 2015 following the arterial road network (Perintis Kemerdekaan Street) and the toll road (Makassar Industrial District/KIMA). Settlement developments follow a linear pattern along Perintis Kemerdekaan Street (Fig. 4).

Fig. 4. (a) Residential land use map (2003), (b) Residential land use map (2015) Settlemente

2.2 Analysis of transport network development

Transportation systems issues within in the settlement area scope are non-integrated in the system, such as the settlement area development on the arterial road network, while the plan must be residential area should be on the secondary collector roads and the primary collector road. Small cluster housing developed using the arterial road as the main access that connects the city center with real estate. According to the Directorate General of Bina Marga [2], the arterial road network is a network of roads linking the region with each other so that the primary activity of the vehicles tend to be high with most low speed 60 Km/hours.

Fig. 5. Map of residential area along the arterial Road (Perintis Kemerdekaan Street)

In addition, other problems encountered was non-integrated road network in the residential neighborhood built by developers and the self-help houses around it (Fig. 3).

Road network in the residential area should be continued so as to make it easier to access especially in the self-help houses/local outside the gated.

The settlements are on the Goa Ria Street (Sudiang Sub-district) utilizing a collector road network as the main access to the public services center that have connectivity with the arterial road network (Fig. 6). The importance of road network connectivity also greatly affect the infrastructure of his supporters, such as the drainage network. Not continuously of the streets network and drainage network may cause the inundation on certain territories which certainly can lower the quality of the environment.

Fig. 6. Makassar suburb residential map

The development of settlement that is incompatible with the function/hierarchy of the road network may give rise to various problems of traffic on the arterial road, because of the many obstacles the side as well as the high inflows, causing congestion on arterial road network and have a direct impact on the environmental as a result of the disposal of vehicle emissions.

Fig. 7. Arterial road network (Perintis Kemerdekaan Street)

(a)

(b)

Fig. 8. (a) Collector road network (Paccerrakkang Raya Street) and (b) Local road network (BTP, blocks. AF)

The fulfillment of the community needs will certainly make use of private vehicles to reach the public service center is at a distance of more than 500 m (beyond the distance for pedestrians). Motor vehicles using may issue high emission vehicles in large numbers and can lower the quality of the environment especially if not supported by the green belt or green line (Fig. 7 and Fig. 8).

2.3 Transport system alignment concept

As the one continues development land use every year, housing and settlements need of referrals which are certainly integrated with the transportation system. The following illustration (Fig. 9) describes the direction of the provision of housing on the local road network and secondary collectors. The arterial road network is reserved for the primary service center that has connectivity to the city center, while the primary collector using for mixed land use like settlements and local services center.

Fig. 9. Illustration of land procurement direction

Real estate development is directed to be on the primary collector road network which is supported by new local road network planning. Road network development is expected to remain constant so that it can keep connectivity of transport network as well as all infrastructure supporting.

Road network planning with the green concept is also expected to be realized well (Fig. 10). It is implemented as an effort to improve the quality of the environment in housing and settlements area.

Fig. 10. Illustration of the green concept application on the road network

3 Conclusion

Settlement characteristics are divided into two types, namely residential real estate and local housing/self-help. The development of land use was spread on the suburban area and constantly developed by following arterial road network. Real estate tends to use arterial road network as the main access to the center of a city.

Road network did not continuously occur in the area of the settlements which are commonly caused by the development of real estate which forms a gated community. It also results in non-integrated of the road network that connects the real estate and self-help housing. Other issues on this discussion, road network can affect network support system such as a drainage network so it can cause problems on the environment like congestion and vehicle emissions disposal arising due to the high use of motor vehicles.

Implementation of the transport system and housing alignment concept like the direction of the residential land use development in accordance with the road network hierarchy as well as the implementation of the green concept in road network planning.

References

1. Law no. **1** on Housing and Settlement Area, (2011)
2. Directorate General of Bina Marga, Guidance on Determination of Classification of Road Functions in Urban Areas, No. 010/T/BNK/1990, (1990)
3. K. Imamah, *Land Use Development and Eco-Friendly Transportation (Pengembangan Guna Lahan Perumahan dan Transportasi Ramah Lingkungan)*, Thesis: Hasanuddin University, (2016)
4. Regulation of the Minister of Transportation no. **49** on National Transportation System (SISTRANAS), (2005)