The place character as land use change determinant in Deli Serdang

D Lindarto, Sirojuzilam, Badaruddin and DN Aulia
Regional planning Department, Universitas Sumatera Utara, Medan, Indonesia

Abstract. The Mebidangro concept of development (Medan, Binjai, Deli Serdang, Karo) in Sumatera Utara creating peri urban area in region hinterland Medan city especially in Tembung village, Percut Sei Tuan District. This peri urban area is a conjunction of several rural-urban activities that forming a friendly atmosphere. The dynamic of population structure shows occurrence the sprawl of land use change condition. In the site of the urban region showing the unique performance that built the place character. The aim of the study is to uncover the place character as one of land use change determinant factors. The study conducted with quantitative approach intended at obtaining variables which describing several factors forming land use change. Descriptive approach give an idea, justification, and fact-finding with correct interpretation. Data collected through a purposive sampling of 320 respondents who stay and built the building and land between 2010 till 2014. With overlay figure/ground technique, scoring analysis, descriptive quantitative and SEM (Structural Equational Models) gained a result that urban heritage (p=0.008) potentially as one of the main land use change driving factors besides accessibility (p=0.039), infrastructure (p=0.010), social-economic (p=0.038) in fact topographic factor (p=0.663) was inversely potentially. The implication of the findings is required intensive attention toward the form of place character (mosque, the quarter, district activity, peri urban edges city and railway) as determinant factors of land use change considering forming the identity of the rapid change in land use transformation.

Keyword: Urban Heritage; Land Use Change; Deli Serdang

1. Introduction
Physical development of the city area is characterizing by the expansion of settlements along the natural population growth and migration. Lack of urban land in the city center encourages alternative options for people to settle in the suburbs (hinterland) that inflict the phenomenon of the growth center in the peri-urban area [1]. The development of settlement in the growth center in its hinterland, have a diversity of distribution of dynamic forms which created a linear pattern (ribbon, star-shaped development) or random pattern (leap-frog development).

Variations in the utilization of urban space and potential of the local environment is an attractiveness factor (pull factors) puller for people and town functions which form a spatial variation of accelerated development which occurred. Some of the region appeals for the establishment of a central location for growth including a need for settlement requires suitable land so the right topography can be an attraction for development [2]. Hinterland area with city infrastructure condition and accessibility of closeness between public facilities become the appeal for urbanization resulting in the formation of the city morphology [3]. Structuring of architectural elements, infrastructure, and
landscape can form images of the city with easy orientation as the region attractiveness for settlement [4].

Several land-use change depends on local cultural, economic and social conditions of land use [5], population growth, accessibility, infrastructure and economic exchange between adjacent region [6], local cultural values, norms, lifestyle, socio-economic lives, time and transport activities [7][8], the Government's Planning Policy [9].

Development of the region gave rise to inequality and development in the border region, hinterland or peri-urban dynamic [10] [11] [12] [13]. Dynamics of development of the region is thus in line with the concentric zone theory [14] i.e. the development tend to be originated from the center of town (agglomeration) widens towards the outskirts of the city (the border region/hinterland). The development of the area influenced push-pull factors, regional spillover, urbanization, potential location, infrastructure, spatial planning, and the advancement of technology [15], agglomeration [16], urban sprawl [17], urbanization [18].

The city-linkage concept Mebidangro (Medan, Binjai, Deli Serdang, Karo) developing the condition of neighboring regions between Medan City with Deli Serdang Regency. Tembung Village as one of the neighboring region appears 735 ha, 515 ha of extensive undeveloped land and 220 ha of RTH extensive, with the population around 100.776 inhabitants [19]

The expansion of Medan City development benefited Tembung area. In this location, there is a government building, Hajji hospital, University of Medan, the State Islamic University of North Sumatra and exclusive residential Bagya Citraland City. Tembung area is also the gateway to the city of Medan from Kuala However Airport as part of the concept of the Aerotropolis Deli Serdang. Revealing the toll access Medan Belawan as a catalyst for region economic growth.

The density of Tembung Village average of 99.45 inhabitants per hectare showed the symptoms of the chaos behavioral norms of rural people facing urban atmosphere. The population structure of the area is a mix of Tembung native of the rural community, the city urbanists (due to the conurbation of urban centers around Medan), the village urbanists (due to urbanization of villages around Tembung) and the commuters.

The diversity of jobs in Tembung area shows the distribution of Civil Employees (PNS) and the Armed Forces (ABRI) with the number at 22.6%, private employees at 24.2%, Trade and Services at 46.8% and Construction at 4.6% and 1.8% work in agriculture [20]. In the period of the last of 5 years, land use patterns of Tembung area showed the form of displacing agricultural land settlement formed star development pattern and tend toward the chess / leap-frog development.

Land conversion events which many occurred in hinterland area, is a housing development group/real estate cluster and residential township. In general, attractiveness factors of residential development is urbanization and conurbation to the suburbs, the gimmicks of developers (modern-style house, exclusive atmosphere, gated communities), the property value (an affordable price with ease of ownership mortgage), the availability of public facilities around, accessibility, proximity to the job site, roads, public transportation. Meanwhile settlement development with township style managing by the local population affected by natural population growth and socio-cultural factors behavior change as a result of the inclusion of city culture information (the trend of non-agricultural jobs, models and architecture technology, cultural metropolis penetration) to suburbs [21]

In the context of classical location theory, economic scientist Walter Isard confirmed the role of transportation and the potential of local industries determination and the occurrence of Weberian agglomeration by putting the accessibility, infrastructure, availability of natural and human resources as a function of the region growth center. Walter Isard also introduced that there was a joint action space, a place which is a blend of several potential locations became attractiveness [22]

A city has a strong character in architectural phenomenological which is known as the Genius Locus, is the spirit of place as a character that makes space materialized as a sophisticated place. Lynch research in “The image of the city” showed elements of the city's architectural landmarks, paths, edges, nodes, the district as an embodiment of genius locus which capable of functioning as a
role potential attractiveness of the region. To make the place character more recognizable then genius locus should be understood not only physically but included the activity or the event [23].

With GIS mapping we know that Tembung area occurs land use change in settlements that tends to form growth pole pattern and linear development. Therefore this study focused on the influence of relevant factors, besides topography, accessibility, infrastructure, socio-economic but the place character.

This study aims to determine how the influence of development factor including the genius locus towards the formation of land use and settlement patterns in Tembung area. The results of this study are useful to examine the place character as attractiveness factors to facilitate the prioritization of infrastructure development in Deli Serdang Regency.

2. Method
The study conducted with descriptive quantitative approach [24] intended at obtaining variables which describing several factors forming land use change. Descriptive approach intended to give an idea, justification, and fact-finding with correct interpretation. Data collected through the purposive sampling of 320 respondents who have built the house between 2010 till 2014.

The analysis was conducted with overlay figure/ ground technique, scoring analysis, and SEM (Structural Equational Models) [25] to obtain a significance level of variables influence in topography factor, accessibility, infrastructure, socio-economic, place character toward the land use change in Tembung area. The analysis tools are Analysis of Moment Structures (AMOS) that can be used to analyze the data, analysis covariance and causal modeling. In this study, the equation was formulated to express causality between various construct. The structural equation proposed in the conceptual study as follows:

\[ Y = \gamma X_1 + \gamma X_2 + \gamma X_3 + \gamma X_4 + \gamma X_5 + \zeta \]  

\( Y \) = land use change  
\( \gamma \) = direct relationship exogenous variables with the endogenous variables  
\( X_1 \) = topographic i.e. low groundwater levels, and flood free  
\( X_2 \) = infrastructure i.e. roads, electricity, waste transportation, sewage funeral  
\( X_3 \) = accessibility i.e. public transportation facilities  
\( X_4 \) = socio-economics i.e. social harmony in the organization, cooperation, maintain security/ environmental hygiene, religious harmony, social capital  
\( X_5 \) = the place character i.e. architecture, event, celebration, public place  
\( \zeta \) = measurement error

3. Results and Discussion
Land use change of Tembung area in the last five years (2010-2014) occurred in the village of Medan Estate, Bandar Khalipah, Bandar Klippa, Sei Rotan, Sumber Rejo Timur and Tembung in Percut Sei Tuan District of Deli Serdang Regency with the following description:
The analysis results of attractiveness factor in regional development towards land use change in Tembung Area with the standard value of affecting as follows:

Table 1. The Standard Value of Affected

| No | Value      | Standard       |
|----|------------|----------------|
| 1  | 1.00 – 1.75| Poor Affected  |
| 2  | 1.75 – 2.51| Less Affected  |
| 3  | 2.51 – 3.25| Affected       |
| 4  | 3.25 – 4.00| Very Affected  |

3.1. Potential attractiveness of topography land, infrastructure, and accessibility

The condition in Tembung area is relatively flat as ex-tobacco plantation PTPN 2 with low groundwater levels, and flood free is a potential topography attractiveness. The elevation surface of rainfed which shallow is the potential convenience of the maturation process of wetland to be a plot of ready to build land. The topography potentially effects on the land-use change. (the average score=2.58). Figure 2 showed the topographic condition.
Tembung area has public facilities such as schools, shops, markets, public transportation terminals/ bus stops, places of worship, hospitals, post offices, banks and government facilities, roads, electricity, waste transportation, trench drain/ sewage, funeral are potential attractiveness of infrastructure (average score=3.00). The transportation fluency of public transport and taxis are potential attractiveness in accessibility (average score=2.72). The infrastructure and accessibility condition are seen in figure 3 and figure 4 below.

![Image](3)

**Figure 3.** The Infrastructure in Tembung Area

![Image](4)

**Figure 4.** The Accessibility in Tembung Area

### 3.2 Potential Attractiveness of socio-economic society

The rural social atmosphere in the form of social harmony in the organization, cooperation, maintain security/ environmental hygiene, religious harmony, tribal, egalitarian attitude become attractiveness for settlement in the Tembung area. Newcomers cultivate a motivation attitude, and competition for residents regarding development variety in architecture function, change in business type indicates the nature of urbanity (business developer business, dormitory, houses rental, shops).

There are changes in the appearance of identity or social status by changing the traditional residential architecture into a city style stone house. The utilization pattern of residential functions into a mix-use shop or office home become a trend in Tembung area. The phenomenon thus becomes a factor of socio-cultural appeal (average score=2.65). Fig. 5 facing social-economic scene in land use change area.
3.3. Potential Attractiveness of place character

The place characters in Tembung area appeared by the landmark of Kuala Namu Airport, Citraland Bagya City Housing, Unimed and UIN universities, type A hospital - Hajji Hospital, Belmera Bandar Selamat Highway and road to Kuala Namu International Airport and Simpang Jodoh Fair are events of local activities which become a pull-factor of the character of the place i.e. landmarks, path, nodes, edges and district (average score=3.00).

![Figure 5. Social-economic scene in Tembung Area](image)

![Figure 6. Bagya City Real Estate as landmark in Tembung Area](image)

3.4. The influence of The Place Character factor to Land Use Change in Tembung Area.

The condition of former land estates landscapes and rainfed relatively sloping and flat, the ground water levels are low, and the condition of free air pollution is considered favorable as ready-built land for enthusiasts plots ready for construction or business real estate developers. The significance results of several influence factors of land use change in Tembung indicate that the topography factors do not affect the land use change (p=0.663). Thus the topography factor does not significantly affect the main attractiveness towards land use change. Another research reveals that topographic variables do not affect the comfort of living in a hilly area which is convenient and flood free [26].

Accessibility factors are significantly affecting land use change (p=0.039) which means the place with the ease of accessibility in everyday activities travel occur intensively land use change. The higher of accessibility convenient then increase the land use change (i.e. main road Medan-
Batangkuis, train station area, neighborhood market/shopping of Simpang Jodoh/ Simpang Gambir, school area)

Infrastructure factors significantly by varies inversely with land use change \( (p=0.005) \). The more complete of regional infrastructure such as roads, electricity, water, trash, sewer, public transportation terminals, funerals will raise the price of land so that the area becomes less desirable for middle-income people. People prefer areas with simple infrastructure with affordable land prices. In the area of less infrastructure will be a change in land use intensively. The influence coefficients testing through regression weight with SEM-aided models AMOS program showed the following results:

Table 2. Regression weight analysis

| Source     | Estimate | P     | Result    |
|------------|----------|-------|-----------|
| LUC \( \leftarrow \) Topography | 0.043    | 0.663 | Insignificant |
| LUC \( \leftarrow \) Accessibility | 0.193    | 0.039 | Significant |
| LUC \( \leftarrow \) Infrastructure | -0.321   | 0.005 | Significant |
| LUC \( \leftarrow \) Socio Economics | -0.025   | 0.038 | Significant |
| LUC \( \leftarrow \) The Place Character | 0.345    | 0.007 | Significant |

Socio-economic factors are significant but have inversely to land use changes \( (p=0.038) \). Urban social effect order and the plurality of entrants make the paradigm shift in social attitudes. People are more attracted to the city’s housing which individual solitary and clustering (gated community). The better the social atmosphere of the countryside will be little land use change. The higher price of land will be less attractive to the public so that there is no land use change. This results similar with land use change research in the peri-urban Jakarta. That research revealing a stylish city social conditions and economic level increases community settled in the area \[27\].

Finally, the place character factors are significantly influencing in land use change community in the same direction \( (p=0.007) \). The attractiveness/ genius locus of Tembung area include the image of identity pride, the prospect of an elite location, an exclusive place for its people. The closer to the potential of the place character, then there will occur land use change intensively. These results are in line with findings of the importance of paying attention to genius locus power factor Norberg-Schulz, not only for architecture but also to the urban planning by way of a friendly attitude with nature \[28\].

The place character contained in Tembung Area is a landmark in the form of the plantation image area and several monumental mosque. The activities in Simpang Jodoh as a traditional trading place is the attractive fixed nodes. The development of high-end luxury scale residential named Bagya City is the leverage factor for this growth centre as a district with a high attractiveness. Tembung district as the peri urban area is an edge city grew rapidly in the development of the area and rural-urban hue that shows the strong distinctive character as a local wisdom. Meanwhile, the train-road Medan-Kuala Namu and Belmera toll road is a path transportation and shows the pull accessibility for the occurrence of land use change.
Figure 7. Landmark attractiveness

Figure 8. Nodes attractiveness

Figure 9. Path attractiveness

Figure 10. Edge Attractiveness
The implication of this findings is required intensive attention toward the place character that built by the existence of mosque, the quarter, district activity, peri urban edges city and railway as determinant factors of land use change considering the ability to forming the identity of the rapid change in land use transformation.

4. Conclusion
The place character along with the accessibility factor is the determinant factor for the occurrence of Land Use Change significantly. Together the factors of socio-economic and infrastructure factors significantly affect Land Use Change are inverse.

The place character factors is a non-physical attractiveness which most influence on land use change in Tembung area. The place character exists in landmark potential (architecture), the path (road and infrastructure), district (regional identity) and local activities as a genius locus.

The mentioned factors above are indicators of spatial changes in land use settlements which form sporadic zones (leap-frog development model). By knowing these factors, it describes the tendency toward land use change in the form of spatial architectural thus can be anticipated the urban sprawl to control the use of spatial region effectively and efficiently for regional development. The implication of the findings is required intensive control in space utilization considering the rapid change in land use transformation that tends to have the negative impact of urban sprawl.

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