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SPATIAL STRUCTURE OF WATERFRONT CITIES: COMPARISSON BETWEEN KENDARI AND MANADO

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Abstrak : *As an archipelagic country, many cities in Indonesia exist and grow at the waterfronts. This research aims to explore comparatively the spatial structure of two waterfront cities: Kendari represents a bay-front with U-form coast line, and Manado as a sea-front with straight line coast line. The spatial structures are represented by spatial pattern, land use pattern, population density, road network, BCR and urban hierarchy. Data were collected through field survey, reading government documents and doing in-depth interview of some key informants. Descriptive and comparative analyses - both similarities and differences - on spatial structures were focused on the relationships between spatial structures with the existence of the waterfronts. The findings show that at the early period of growth, spatial structures of both cities were formed by the existence of the waterfront similarly. Influenced by physical development such as commercial facilities and housing settlements, the spatial structure recently spreads out to the mainland area created some new sub-centers. Understanding the character of spatial structures will be significant for directing and controlling the urban land use to create a sustainable waterfront city.*

Keywords: urban waterfronts, spatial structure

INTRODUCTION

Known as an archipelagic country, Indonesia has more than 17.508 islands, 81.000 km of coastal lines, and total area of sea 3,1 million sqkm (Damhuri, 2004), most of cities in this country do exist and face a water body area i.e. sea, lake, or river. They are called waterfront cities. Waterfront means an area where water body meets the land.

A waterfront city typically was started by a small port and continued by the emergence of marine commercial areas and inland transportation that connected to the port. Having a strategic position – a navigable area at waterfront – the waterfront city than grows rapidly. It is not only grown by marine commercial activities but also by housing and recreation facilities. Facing a water body at one side, the waterfront city grows to the inland direction. Increasing number of population density, change of sea transportation technology, and the demand of space to accommodate the fast growing economy, all those require larger space. Unfortunately the growth sacrifices the strategic location at waterfront. The situation also was worsened by strong competition to occupy space at the waterfront on one hand, while there is a lack of vacant space on the other hand. As a result it makes the waterfront becomes a very high intensity of land use.

Spatial structure is a comprehensive identity of a city. Trisutomo (1997), Bobic (1990) as well as Esner and Galion (1993) describe that spatial structure is composed by road network, hierarchy of center and sub-center, land use pattern, the spreading of human settlement, gradation of buildings density and the availability of natural resources. The spatial structure can be said like a backbone of human body where other parts of the body exist and grow. The spatial structure finally creates strong urban development pattern at waterfront. Referring to Indonesian Act No. 26/2007 of Spatial Planning (*Undang-undang Penataan Ruang*), spatial structure is a composite of functional and hierarchic of social and economic centers, and supported by network of infrastructures. In this sense, spatial structure consists of center and sub-centers supported by infrastructures network.

In terms the role of spatial planning, spatial structure plays important role in urban and regional development. The new physical development tends to site closer to the road network due to get high accessibility. Land use pattern and the hierarchy of center to sub center help to organize the location of activities, while the human settlement pattern controls the land use. Spatial structure also describes the balance between natural resources and the physical development. In certain purpose, the spatial pattern is also able to direct and control the development without deteriorating the quality of waterfront itself.

Research Questions

This research is aimed to explore the two questions:

(1) How are the spatial structure of Kendari and Manado?

(2) Based on the form of coast line, what are their similarity and differentially of them?

Objective and Significant of Research

This research aims to explore comparatively the characters of spatial structures of two waterfronts cities that each has different in their form of coast lines. Kendari develops at U-form waterfront lines and Manado at straight lines coast line. Understanding the urban spatial structure is an important key to

manage the growth of urban waterfront sustainably.

INDICATORS OF SPATIAL STRUCTURE: A CONCEPTUAL FRAMEWORK

Referring to the Act of Spatial Planning (*UU Penataan Ruang*) No 26/2007, spatial structure means a composite of center and sub-center that supported by infrastructures network. In this sense, the component of spatial structure consists of center, sub center of the city, and infrastructure.

Clasical theories of urban structures substantially describe the distribution of space functions in an urban area. Ichikawa (1982) discuses the classic of spatial structure theories such as concentric Stars theory of Hurd, Concentric Zone theory of Engels, Sectors theory of Wegde, and Multiple theory of Harris and Ullman. Most of those theories describe the land use and spatial organization.

Elements of spatial structure has been examplified by Davies as discussed by Carter (1975). He describes components spatial structure cover site and situation (environment) and population pattern. Hebert and Johnson (1987) also summaries component of spatial structure. Those are zoning (land uise), road network and urban hierarchy.

On the other hand, Berteaud (2005) insists that urban structure is compounded by certain components: population density, building density, land use and hierarchy of center and subcenter, and supported by infrastructure i.e. road network in order to make the functions work perfectly.

Some previous research has done on spatial structure. Trisutomo (1998), Elewa (1988), and Darsosanjoto (2005) found that spatial structure of a city represented by road network, urban hierarchy and BCR. Alexander (1993) also found that BCR is an indicator of spatial structure.

Drawing from previous discussion, in this research identifying urban waterfront spatial structure applied sevent indicators: spatial pattern, population density, land use along waterfront, road network, BCR by distance from coastline, and urban hierarchy.

METHOD OF RESEARCH

The Urban Waterfronts

This research has chosen two waterfront cities, Kendari and Manado. Reasons of choosing the waterfronts are, firstly, both the waterfront cities are the capitals of province that accessible to collect data. Secondly, each city has different form of waterfront. Kendari exists and grows around the U-form coast of Kendari, Manado lays at the straight line of coast of Sulawesi Sea; both are in the Sulawesi Island. Choosing two different setting provides broader analyses (Figure 1).

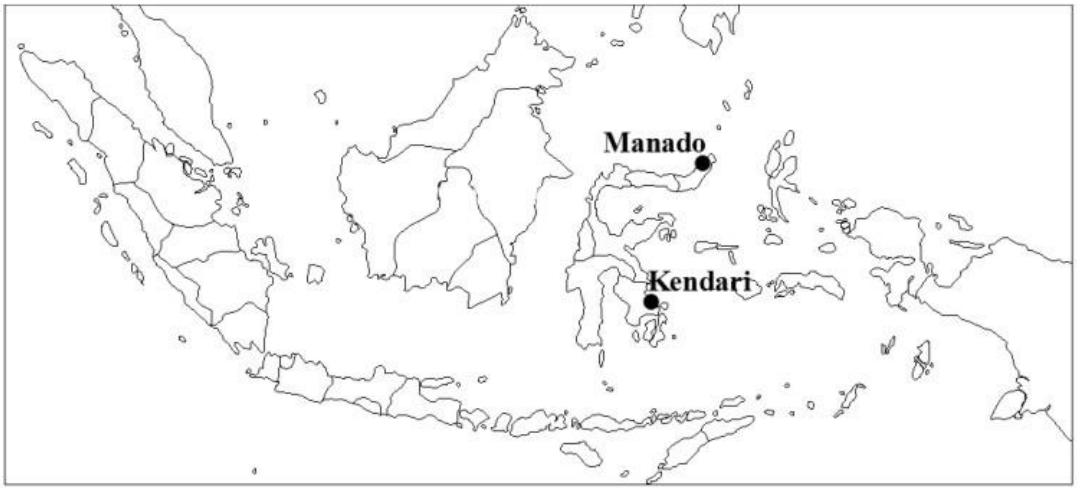

Figure 1. Location of Kendari and Manado Waterfront Cities

Method of Data Collection

Primary data were collected by doing field observation, having indepth interview with key informants such as the Head of City Planning and Development Board (Bappedakot) and the Head of Spatial Planning Agency (*Dinas Tata Ruang Kota*) and academicians. Data related to city spatial planning, statistics and descriptive information as secondary data were collected from official documents i.e. Spatial City Planning (*Recana Tata Ruang Wilayah Kota* = RTRWK), BPS and related information were downloaded from the website. From secondary data this research earned spatial pattern, population density, land use, road pattern, and urban hierarhy. Building coverage ratio (BCR) – the ratio between ground floor area of a building and the total area of land parcel – were gained through digitizing the image and then calculating the floor area. Purposively they were taken from three locations as samples: CBD, seaport and housing area. Qualitative analyses were done through comparing the indicators of spatial structure i.e. population density, BCR, road network, urban hierarchy and land use along the waterfront. Analyses were focused on the relationship between the existence of waterfront with the spatial structure.

FINDING AND DISCUSSION

A Brief of the Waterfront Cities

Kendari and Manado both are the capitals of the provinces. Kendari is the capital of South East Sulawesi Province; Manado is the capital of Northern Sulawesi Province. Kendari exists around Kendari U-form coast, Manado faces the straight line coast of Sulawesi Sea. Following table describes the comparative of waterfronts in terms of total area, population and its density, length of coastlines, topography and the waterfront.

Table1. The two waterfront cities: Kendari and Manado

Cities / Description	Kendari	Manado
Total area (km2)	295,89	157,26
Population (2008)	254.336	602.117
Population density (p/km)	859	3835
Length of coastline (km)	31,36	23,90
Topography	Hilly	Hilly
Waterfront	Bay of Kendari	Sulwesi sea

Source: BPS Manado (2008), Kendari (2008)

Origin and the Growth

Historically, the growth of the two cities started at the waterfront. Kendari waterfront city with a bay is in the center of the city, was started from the area of sea port now called Pelabuhan in Kendari district. This city than grew around the U-form bay. Since the city has been declared as a municipality in eighties, the government built a ring road around the bay called Bypass Road. During the last two decades, due to the limited space at seaport area and the existence of road network in the south, the city center was moved. It resulted two commercial areas i.e. Mandonga and Wuawua. These areas grew rapidly and now both commercials become new city centers. A very steep hilly area in the northern side also pushes the growth of the city to south direction; the Governor Office area in Kambu district is the result. The U-form of waterfront influences the urban morphology.

Similarly with Kendari, the origin point of Manado city was the port of Manado, precisely at seaport area. The old seaport, two former cinemas, Star and Benteng, indicate the origin point of waterfront city of Manado. At the early period, due to the hilly area, the city grew along the coastal area to the north direction.

Spatial Pattern

Referring the Act 26/2007 of Spatial Pattern, spatial pattern (*pola ruang*) is one of very important component in planning. It is a zoning of conservation area (*kawasan lindung*) and man-made cultivication area (*kawasan budidaya manusia*). In Kendari, the built-up area grows around the U-form of the Kendari bay, although in terms of building density at low level.

In Manado, the built-up areas exist at the waterfront area. It is understandable that historically accessibility has created the built up area. On the other hand, conservation area is at the distance from waterfront.

In conclusion, waterfront areas remain the magnet of the development growth (see Figure 2 and 3).

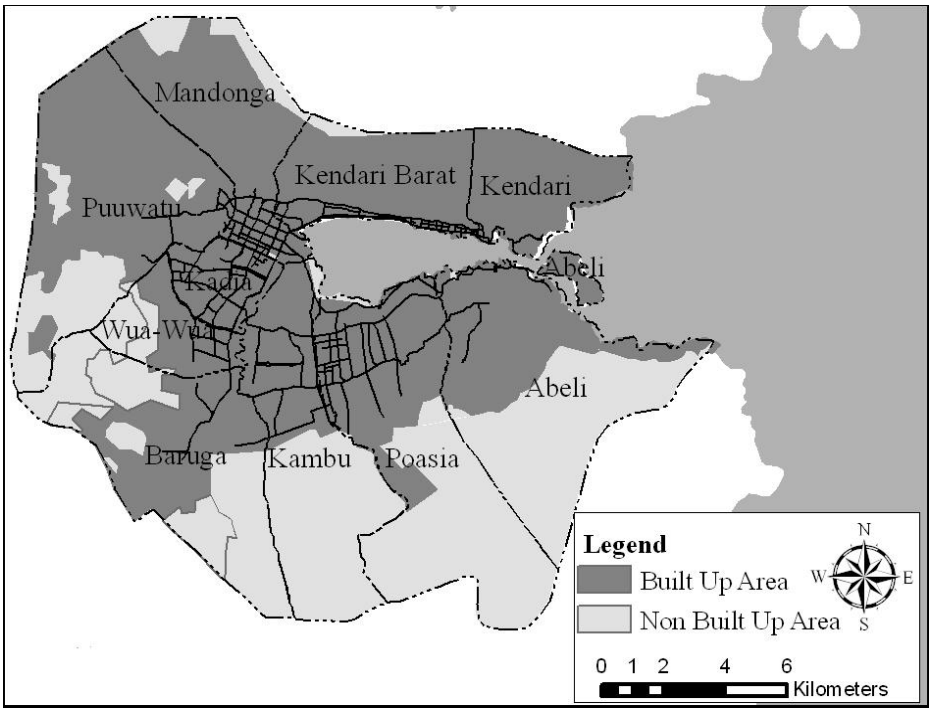

Figure 2. Spatial pattern in Kendari

Manado city also indicates the similar pattern with Kendari (Figure 3). The built-up area also grew from the seaport, moved along the waterfront and spread towards the inland. The non built-up now exists on the hilly area mainly in the northern side.

Population Density

Kendari city is inhabited by 254.236 (BPS, 2008). Among the 10 districts in this city, Kadia district indicates the highest population density (29 persons/ha). This district now has central business districts (CBD), Wuawua and Mandonga. Although Kendari district where the seaport does exist is the oldest part of the city, it doesn't show high population density. As described in the history, the city now grows to the west and north direction where topographically is a plain area.

Among the two waterfront cities, Manado is more populous city. Having 159,02 sqkm, the city is inhabited by 401.410 persons at average population density of 25/ha. Among 9 districts in this city, district Tuminting (114 person/ha), Wenang (105 persons/ha) and Singkil (99 persons/ha) are at the highest population density; those districts lay at the waterfront area. The waterfront remains the most populous density area in the city.

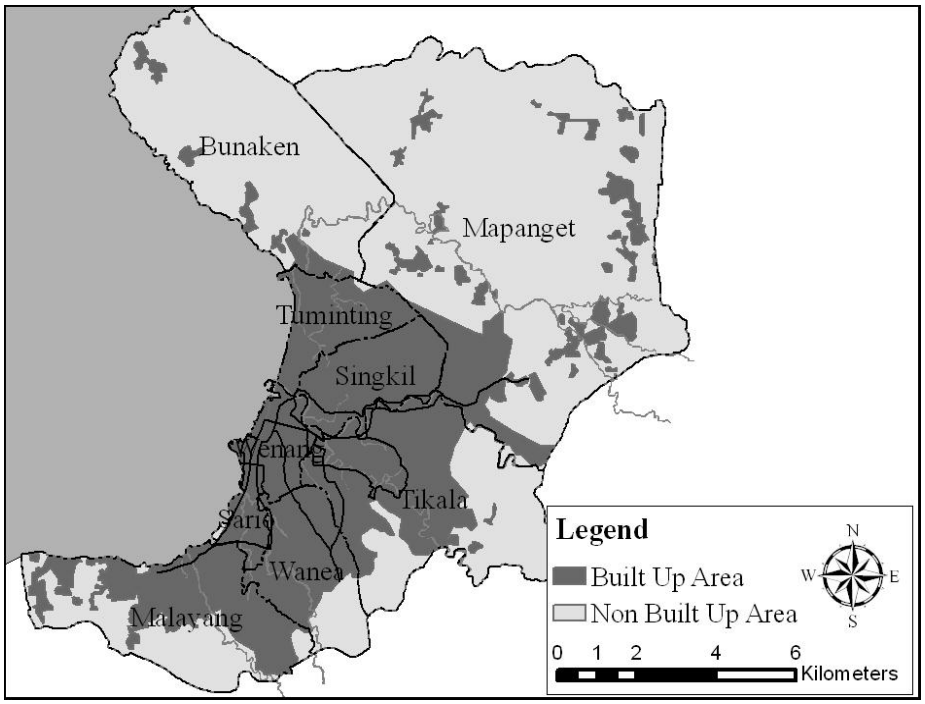

Figure 3. Spatial pattern in Manado

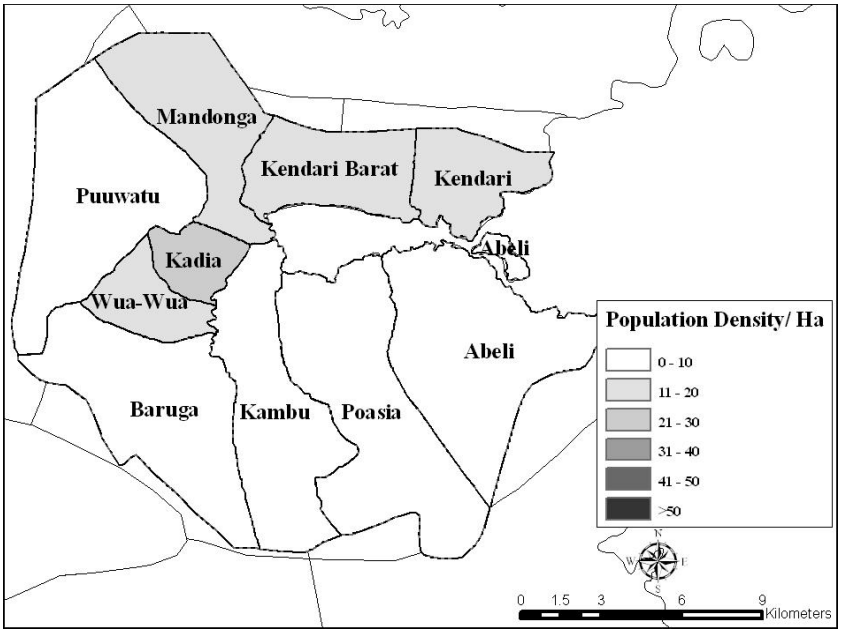

Figure 4. Population density by district (kecamatan) in Kendari

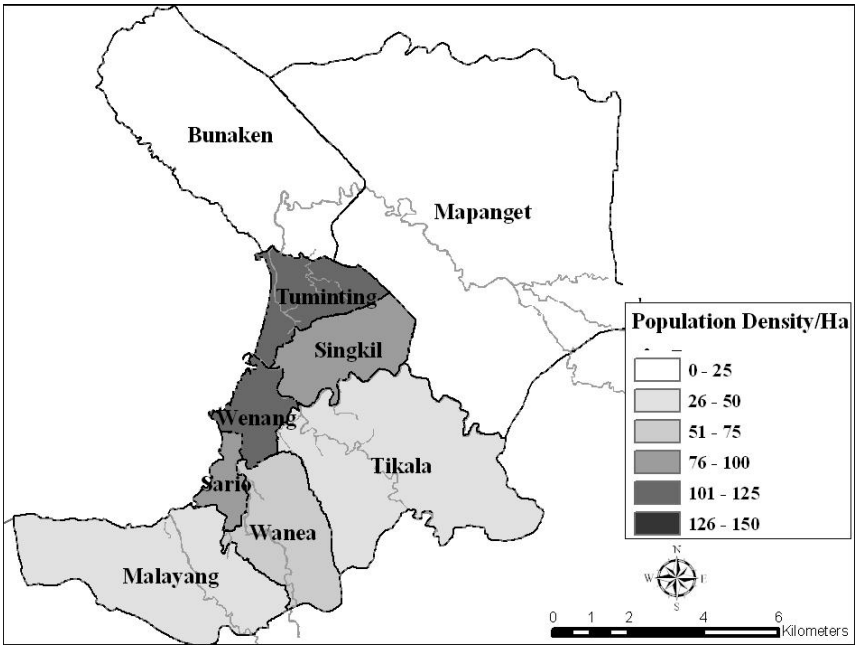

Figure 5. Population density by district (kecamatan) in Manado

Land Use at Waterfront

In this research, land use along the waterfront is identified by housing, open space, commercial, industry and port. The bay of Kendari is the centre point of the city. In the past, the bay was the vocal point which has very attractive view. Figure 6 indicates the land use along the waterfront of Kendari. Mainly, the waterfront is occupied by housing in Kendari Barat, Poasia and Abeli. Kandia and Kambu are dominanted by open space/green belt. Commercial areas spot in port area only.

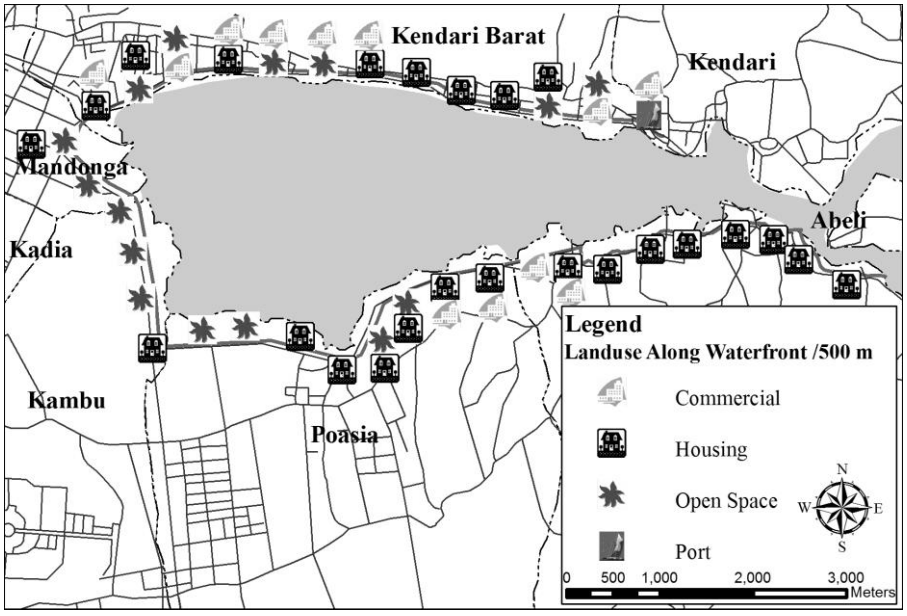

Figure 6. Land use pattern along the Kendari bay-front

Manado indicates different land use pattern (Figure 7). Tuminting and Singkil are housing area while Wenang, Sario and Wanea are occupied by commercial activities such as shopping mall or shop housing. This commercial areas were gained through reclamation projects during the last decade. Green belt and open space exist at Malalayang.

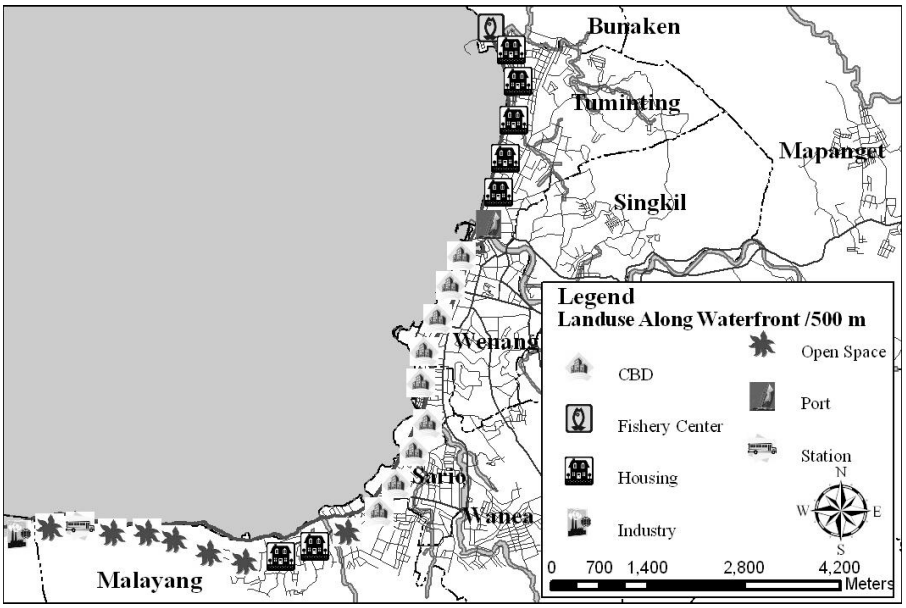

Figure 7. Land use pattern along the Manado searfront

Road Network

In the early period, roads in Kendari started from seaport, then they grew to Mandonga direction where the commercial area and civic center do exist. Recently, the road pattern grows to all areas of the city. Since the last two decades, Kendari built road along the waterfront reached Abeli areas. In terms of streets density (total street length per square area), Kendari doesn't show the road density at the waterfront. Also the U-form of the bay doesn't create a spesific pattern in Kendari significantly. (Figure 8)

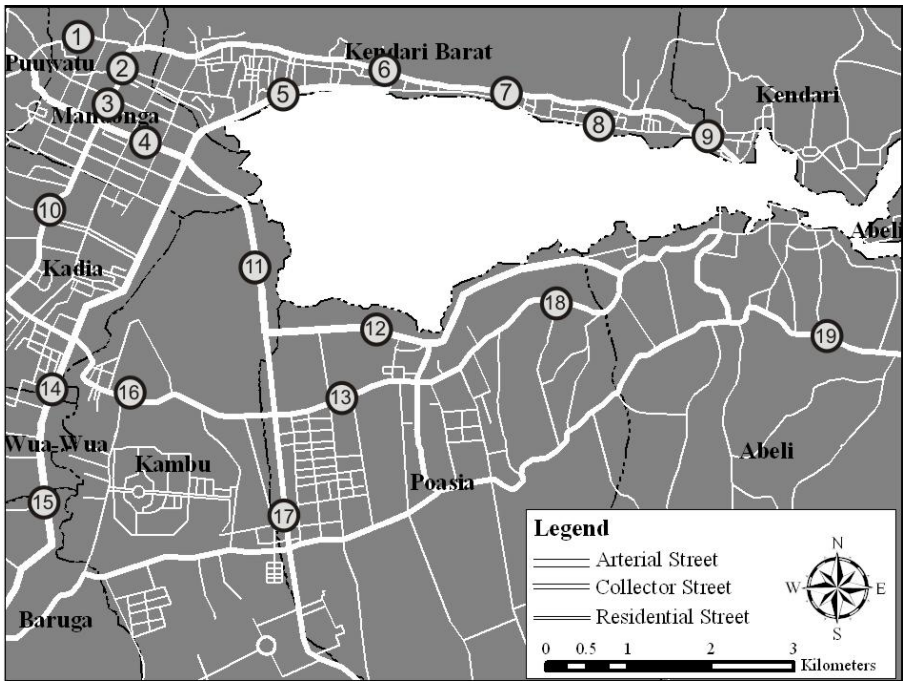

Figure 8. Road network in Kendari

Note: (1) Suprapto, (2) Kendari–Poahara, (3) Abd. Silondae, (4) A.H. Nasution, (5) Alala, (6) Sam Ratulangi, 7. Hasanuddin, 8. Pembangunan, (9) Sukowati, (10) A. Yani, (11) Boburanda, (12) By Pass, 13. Bunggasari, 14. La Ode Hadi, 15. Y. Wayong, 16. M.T. Haryono, 18. B. Sin Apoy, 19. Punggaluku

Manado shows different road pattern (Figure 9). Most of the main road starts from the commercial area*s* at waterfront and goes to inland direction. The waterfront area also indicates higher street density than the area distance from waterfront.

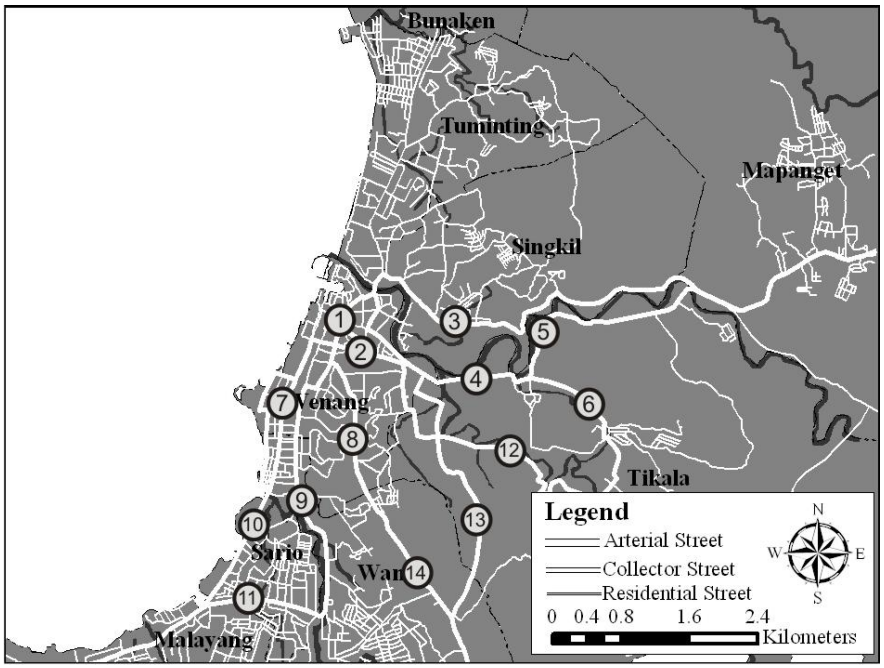

Figure 9. Road network in Manado

Note: (1) Sisingamangaraja, (2) Sudirman, (3) Ari Lasut, (4) Martadinata, (5) Yos Sudarso, (6) Macan, (7) Boulevard, (8) 14 February, (9) Sam Ratulangi, (10) P. Tendean, (11) Monginsidi, (12) Daan Mogot, (3) Pomorow, (14) Tololio Supit

Urban Hierarchy

Urban hierarchy shows the position of city center and sub-centers. City centers are represented by commercial area or central business area (CBD) indicated by highest land use intensity, high density of buildings, more business activities, node of public trasportation systems, and government or civic center. Sub-city centers have identity similarly with the city center but in less intensity of activity .

Referring to RTRWK and doing field observation, this research found that Mandonga in Kendari district is the city center. Here, the bussiness and government center of Kendari Municipality do exist. The sub-centers are Pelabuhan area (the old city in Kendari district), Wuawua (the new bussiness area), and Governor Office area in Kamba. Those centers are linked by the main road and served by public transport called *angkot.* In conclusion, the city centers are not at waterfront and the seaport was not as the city center.

Manado city found differently. It is clear that the center, indicated by seaport and CBD, are available along the waterfront. The seaport remains exist at city center although the main activities of the port has been moved to Bitung in eighties. There are many sub-centers: Kuminting, Mapanget (the airport area), Singkil, Tikala, Winea and Malalayang; the last four are

district centers. Those center and sub-centers were linked by main road pattern and served by public transport called *angkot* (Figures 10 and 11)

BCR by Distance from Coastlines

One indicator to measure building density is building coverage ratio (BCR); it is the ratio between the ground floor areas of the building with land parcel area. In this research, BCR of each city was sampled by three purposive locations, i.e. seaport, CBD and housing.

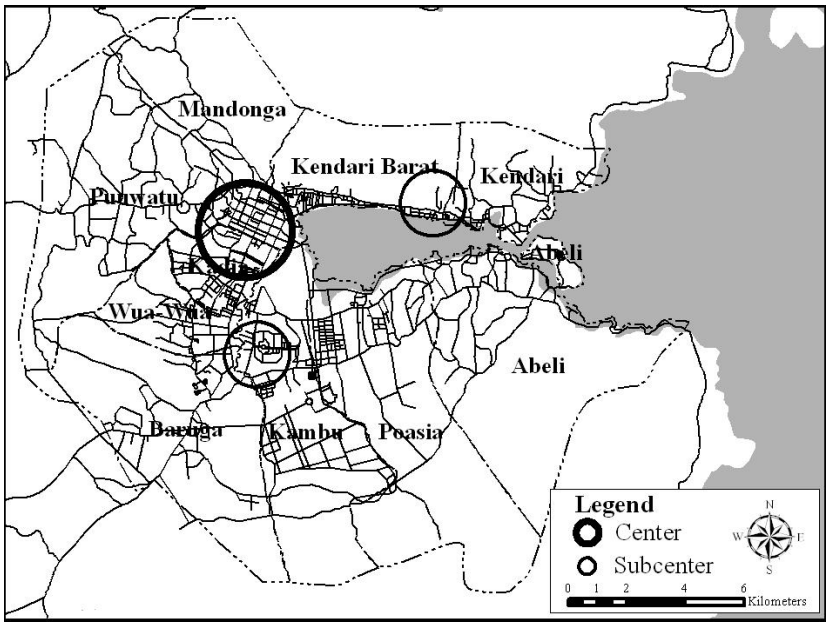

Figure 10. Urban Hierarchy in Kendari

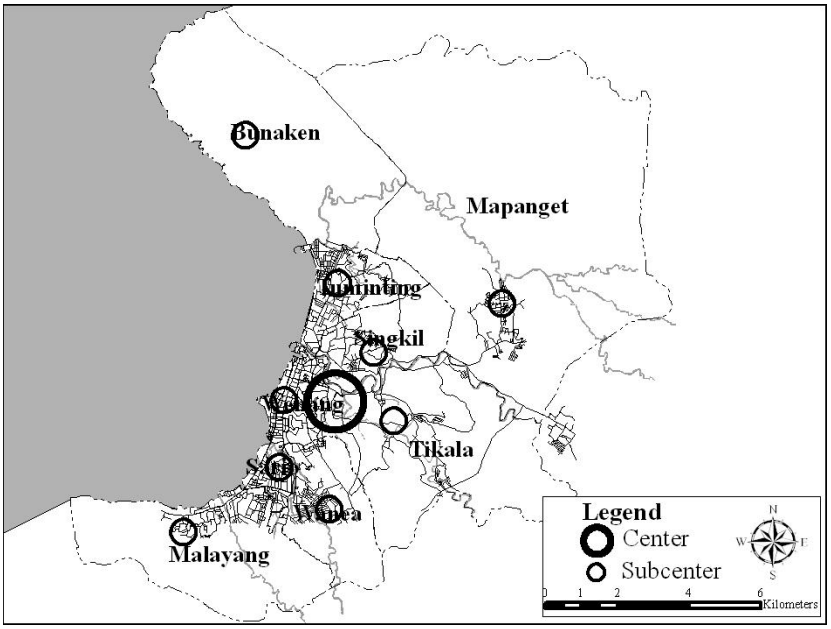

Figure 11. Urban Hierarchy in Manado

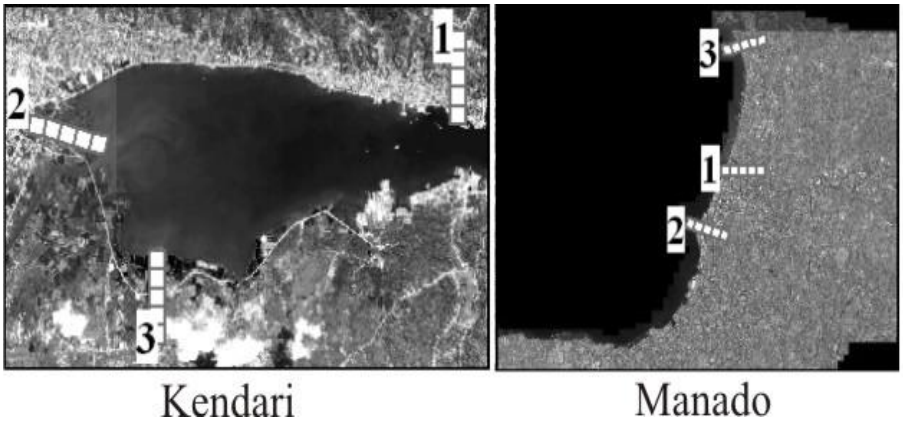

Figure 12. Purposived sampling locations of BCR measurement

Note: (1) seaport, (2) CBD, (3) housing

BCRs of Kendari City in seaport, housing and CBD show differently. In the seaport area, BCR is at the high level (60%). Contrary, CBD and housing at waterfront show lower BCR, and increase at 1000-1250 m distance from the coast.

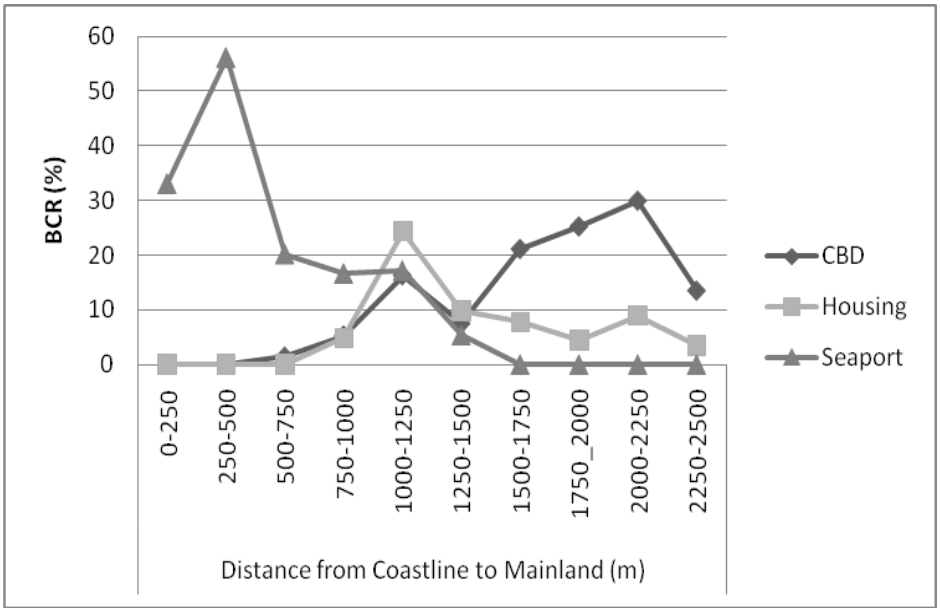

Figure 13. BCR by distance from coastlines in Kendari

In Manado City, BCRs of CBD, housing and seaport show at low level, increase by distance 500-750 m from waterfront. Surprisingly, BCR at CBD is lower at waterfront; it is the good result of government policy that land reclaimation has to provide open space at waterfont in order citizens to access the waterfront as public space freely.

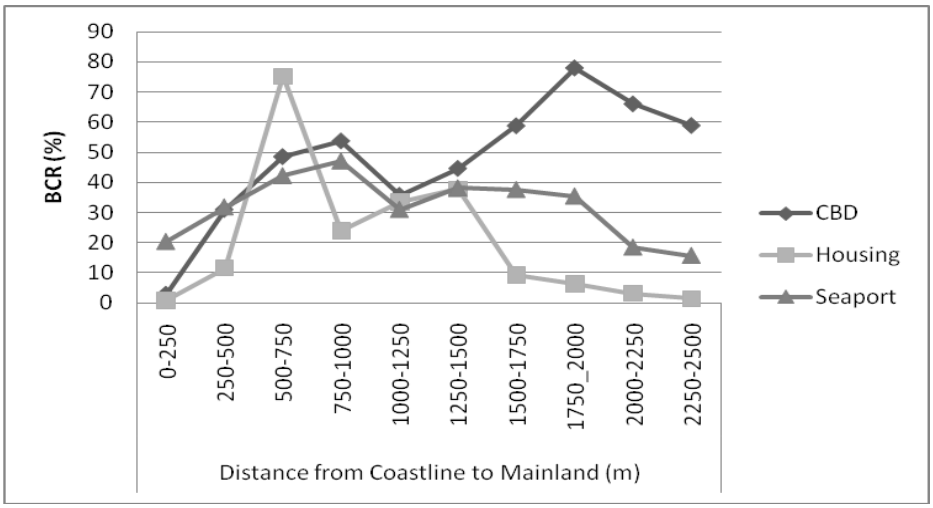

Figure 14. BCR by distance from coastlines in Manado

Summing up, the existence of waterfront in Kendari does not affect the BCR; contrary BCRs in Manado relate significantly with the existence of waterfront.

TABEL 2. COMPARATIVE OF SPATIAL STRUCTURE OF KENDARI AND MANADO

Cities / Spatial structures	Kendari	Manado
Spatial pattern	Built-up area concentrates at waterfront	Built-up area concentrates at waterfront
Population density	Concentrates at waterfront	Concentrate at waterfront
Land use along waterfront (mainly)	Housing and green belt	CBD/commercial activities
Main road pattern	Starts from waterfront and spreads around the bay	Starts from waterfront and grows to inland areas
BCR at CBD area	Lower at waterfrontt	Lower at waterfront
BCR at housing area	Lower at waterfront	Lower at waterfront
BCR at seaport area	High at waterfront	Lower at waterfront
Urban hierarchy: the city and sub-city center	The center are not at waterfront	The centers and some sub-centers are at waterfront

CONCLUSION

Based on the previous analyses, a comparative matric of spatial structure could be drawn in Table 2. Among the indicators of spatial structures, the both waterfront cities show similar of spatial pattern, land use pattern and population density. Other indicators (BCR, main road pattern, urban hierarchy) show differently.

Answering to the research questions, the conclusions of this research are:

(1) In Kendari, initially the pattern of spatial structure began at the waterfront. Currently, it grows around the U-form of Kendari bay; it figures a U pattern. In Manado, the early growth of the spatial structure waterfront also began at waterfront. The spatial structure now concentrates at waterfront and spreads into inland direction; it figures a radial pattern clearly.

(2) Comparing the two cities, both cities have similarity in terms of spatial pattern, land use pattern and population density. On the other hand, other indicators of spatial structure such as BCR, road network and urban hierarchy, Kendari differs with Manado.

Acknowledgement

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