

STUDY ON EFFICACY OF RING ROADS FOR URBAN DEVELOPMENT, BY USING JAPANESE'S EXPERIENCES. "CASE OF KINSHASA"

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1. INTRODUCTION

The capital of Democratic Republic of the Congo (D.R.C), Kinshasa that is a metropolitan area with an excess of 12 million people. This city is one of the biggest in Africa with heavy traffic congestion and city planning issues. Due to that situation, the Provincial Government made a comprehensive Master Plan "SOSAK" (Strategic Orientation Plan of the Agglomeration of Kinshasa) that has for main objective the conversion from the current land condition to a good city¹. By defining the new physical, social economic development, environmental conditions that can make a relevant total urban system. Based on Transportation issues, the objectives of this research are to learn and collect data about Japanese skills of Ring Roads planning and get useful ideas. The urban diagnosis reveals a large under-equipped city, where the OD traffic examination with four-step model flow method applied by the Project of Urban Transportation Master Plan in Kinshasa, completed in 2018, gives 72,506 inbound vehicles per hour. Generally, the Ring Road can accomplish the distribution of the vehicles from suburbs to the city center and reverse². In the future, this project will help the objective of realizing 1,500 km of Highways and Trunk roads with unless 1 km/ha. Therefore, the Ring Road often indicates a circumferential route formed from one or a series of roads within a city, as an express transportation infrastructure that plays a crucial role in the town planning system. Hence, sustaining the traffic and spatial functions of the road as made in several world cities.

2. RING ROADS IN JAPAN

2.1. Basic of the Ring Road Functions in Japan

By creating Ring Road, the traffic bound into the city center or downtown supposed to divert. Then, the reduction in traffic would be useful to mitigate traffic congestion. Therefore, the effects of this road are as follows³:

- To put an end to the traffic flow transit into the city core;
- Distribute streams of traffic from the peripheral area to the urban focal point;
- Direct motion between neighboring areas;
- Move on time even to the discontinuance of some section due to disasters and/or accidents.

2.2. Investigation and Evaluation of Japanese Ring Roads

From the reconnaissance of the field, the major information for beltways in Japan as shown in table 1:

Table 1 of Characteristics of selected Ring Roads in Japan^{4, 5, 6}

N°	Ring Road	Scale of the city (Pop./million and total area/km ²)	Type and Planning period (%)	Road area (length L-km and width l-m)	Structure	Average % of traffic reduction in city core
1	Nagoya	2.3 and 326.45	Outer Ring Road 1967 - up to now (89%)	L= 66 l= 50; 60 and 72.5	Double decker, Overpass and Underpass (3D junctions)	18*
2	Sapporo	1.95 and 1,121.12	Inner and Outer Ring Road 1965-2016 (85%, Improvement)	L= 27.5 (Inner) L=66.4 (Outer) l= 25; 32 and 42	Highway with partial grade separation or surface road (Overpass and underpass Junction)	14
3	Utsunomiya	0.44 and 461.80	Outer Ring Road 1968-1996 (100%)	L=34.42 l=25; 28.5; 40	Highway with partial grade separation or surface road	11

(*) share vehicles of the Ring Road in the total Roads network.

Keywords: Kinshasa, Urban Development, Traffic Jam, Transport Mode, Ring Road.

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It is wealth mentioning that the Sapporo and Utsunomiya Ring Roads are relative to the Kinshasa condition for their designs and evolution because they made from Highway with partial grade separation or surface road structures. In the other hand, the Nagoya Ring Road remains important to set an idea about the application of the land readjustment technique for the successful alignment and to avoid or/and reduce the expropriation that brings many conflicts in Congo.

As a result, in Japan, scientifically calculation of excess ratio traffic demand during the confluence of two roads as the bottleneck of gridlock, shown that the percentage of 10 or more are expected⁵.

3. KINSHASA'S EXPECTABLE RING ROAD AND MODE OF TRANSPORT

From the experiences of exploring these roads, we pointed out some values. The Ring Road could:

- ✓ give the shape of the city and secure against the unexpected city expansion with the possibility to be remade (double) from Inner, Outer and Express (like in Sapporo) in case of dysfunction;
- ✓ have a structure relative to the scale of the city (Population and total area);
- ✓ be used to divert the cross traffics that have no business in the city core, share and distribute traffic with the reduction for avoiding traffic jam (10% or more);
- ✓ have some alignment problems due to the bad urbanization that is solved by the land readjustment (LR) method;
- ✓ have a national road or expressway road that one section is part of Ring Road alignment, for instance, National 04 in Utsunomiya and National 302 in Nagoya that is shaped also as a Ring road;
- ✓ Contribute to the reduction of the traveling time due to augmentation of the speed (smooth traffic);
- ✓ have the overpass and underpass in the important junctions with the possibility to turn right and left;
- ✓ facilitate the communication of two extremity cities by using middle city Ring Road.

To realize this Ring Road, the need to form a highway structure with partial grade separation, especially overpass junction on the busiest roundabouts or junctions to well manage the straight traffic, remain the key solution for Kinshasa.

Table 2 of Transport Mode in the Crowded Part of the City

No.	Mode of Transport	All Modes		Excluding NMT	
		No. of Trips	Share	No. of Trips	Share
1	Car	814	4.5%	814	4.5%
2	Motorcycle	2,064	11.5%	2,064	11.5%
3	Taxi	1,368	7.6%	1,368	7.6%
4	Taxi bus	2,950	16.4%	2,950	16.4%
5	Bus	1,862	10.4%	1,862	10.4%
6	NMT*	8,924	49.6%	-	-
Total		17,982	100%	9,057	100%

*: NMT stands for non-motorized transport including walking and bicycle.

Source: The team study of JICA-D.R.Congo, Project of Urban Transportation Master Plan in Kinshasa. 2018.

4. CONCLUSION

The basic design philosophy for the Ring Road project is to ensure the case of movement for through traffic. The main objectives of this Ring Road construction are mentioned as follows:

- To adapt to the expanding needs of the city;
- To facilitate smooth traffic flow in the city and cut down traveling time;
- Decongest town area and to meet future demand by improving connectivity.

Therefore, the investigation of the traffic characteristics in Kinshasa helps in the geometric design proposal of the Ring Road and traffic control.

REFERENCES

1. Provincial Government of Kinshasa. SOSAK/Final report. Kinshasa City Hall. 2014.
2. JICA-D.R.Congo, Project of Urban Transportation Master Plan in Kinshasa. 2018.
3. Ministry of Land, Infrastructures, and Transport, Maintenance of metropolitan ring road. 2018.
4. Minister of Land, Infrastructure, and Transport, Chubu Regional Development Bureau, Aichi National Highway Bureau. Nagoya Ring Road 2. March 2018.
5. Sapporo City, Traffic Planning Department, Transportation Master Plan. 2017.
6. Utsunomiya Ring Road Improvement Effects Investigation, Summary Report, March 1997.
7. Takashi K., Traffic Engineering and Traffic Planning, Japan, 2010, pp.40-41