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An overview of the transportation issues in Kota Kinabalu, Sabah

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Abstract. The explosive growth of population in Sabah has caused the rise of private vehicle ownership and utilizations which give significant defects on transportation and environmental conditions, especially in the central city of Sabah, Kota Kinabalu. As the demand in transportation increased, traffic congestion occurs due to the abundance of a private vehicle on the road while the improvement of traffic facilities is weak and slow. Traffic congestion is an urban mobility problem that worsens traffic flow and eventually, causing economic hindrance to happen. In order to overcome this problem, a good plan, systematic and safe transportation system should be developed. Hence, the purpose of this paper is to study and understand the transportation system in Kota Kinabalu and the feasibility of existing transportation plans for Kota Kinabalu. This paper outlines an overview of the existing transportation system available in Kota Kinabalu, Sabah, the issues encountered, as well as the impacts regarding the current city transport system. In summary, urban transportation relies on proper planning by experts based on passenger experience to find proper solutions to complex urban transport issues in Kota Kinabalu.

1. Introduction

Kota Kinabalu is one of the urban cities in Malaysia, which facing several challenges in the sustainable transport system. The number of vehicles has increased in Kota Kinabalu due to the rapid population growth, the economic bases evolve, and the housing sector adjusts which consequently caused severe traffic congestion in Kota Kinabalu City over the past few years. This has been proven as the number of vehicles travelling in and out of the city grows by 8.3% annually by the number of roads grows at a slower rate, causing worst traffic congestion mainly during peak hours [1]. Based on the previous study, it is found that during the peak hours which are morning (0730–1030), afternoon (1130–1430) and evening (1630–1830), the most congested road in Kota Kinabalu is along Tun Fuad Stephens Road to Kemajuan Road through Tun Razak and Coastal Road. The contributing factor of traffic congestion was the abundance of vehicles on the road and inefficient public transits in Kota Kinabalu [2]. It will not only bring adverse impact to the commuters, yet to the environment as well such as greenhouse effects, source depletion and land consumption.

Presently, most people are likely to use their private cars compared to public transportation. Only if the system is improved in terms of its reliability, safety and availability as well as reasonable fees, then people will agree to shift to public transportation. According to Datuk Seri Hajiji Noor, Local Government and Housing Minister, an effective public transportation system will be able to solve traffic congestion problem and the efficiency of the system such as enhancement in its accessibility, convenience and security will become an attraction for the public to use it over private vehicles [3].



As Kota Kinabalu is undergoing rapid development, a robust standard public transport system will not only make the process of business and trade smooth, but it will also create a livable city, attract more tourists and reduce the emission of greenhouse gases. Since the income and vehicle ownership are the main factors affecting the use of public transport [4], Kota Kinabalu will have the potential to develop a comprehensive public transport system. This paper presents an overview of the problems or issues with regards to the transportation system implemented in Sabah based on the existing public transport used. At the end of the study, some practical solutions in enhancing the transportation system will be outlined in order to make it productive and able to fulfill users' demands and encourage sustainable transport development in Sabah.

2. Research Objective

The main objectives of this study were to identify the variety of transportation system provided in Kota Kinabalu, to determine the problem and issue of transportation in Kota Kinabalu as well as to define the impact of the transportation system in Kota Kinabalu.

3. Urban Population in Kota Kinabalu

Kota Kinabalu is a city with a population of over 400,000 [5]. By 2020, the population in Kota Kinabalu is estimated to reach almost 1 million has been shown in Figure 1. The Statistics Department indicates that Sabah has the second-highest population in Malaysia after Selangor in 2017 [6]. Kota Kinabalu not only being an administrative centre, but is also a primary destination for the tourists. Based on reports from the Sabah Tourism Board, the number of tourists coming to Sabah reached 3.7 million in 2018 [7]. From this situation, it is evident that Kota Kinabalu does not only consist of Malaysian citizens but also many tourists who will access the roads just like the others. It is not adequate to consider the population growth in Kota Kinabalu alone, but the consideration for the growth of the number of tourists should be taken into account.

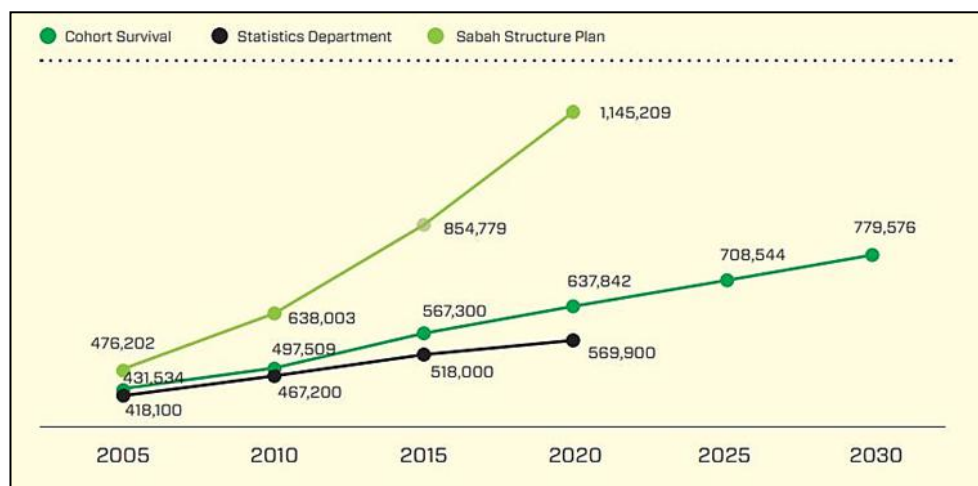


Figure 1. Population Growth in Sabah (Kota Kinabalu).

Source: Sabah Tourism Board

3.1. Transport System

Transportation systems in Kota Kinabalu are considered as urban transportation, and it has developed at a rapid pace. However, it still needs to be improved to meet the specific demands of the growing economy and population. Currently, there are only five types of transport medium throughout the city.

3.1.1. Taxis. Taxis in KK have meters, but most of the cab drivers refuse to use them. The Land Transport Commission has set the RM10 flag fall buys 9 minutes or 3km [8]. However, destinations are often fixed at certain prices with no known formula for how they come up with the rates. Hence, it always creates a dispute among passengers and a taxi driver on arguing on the price.

3.1.2. E-hailing services. Apps like GrabCar and MyCar, also work in Kota Kinabalu City. In 2016, most of the taxi drivers are being unhappy on the E-hailing services since they felt it took business away from them. Ultimately the Malaysian parliament passed legislation that paved the way to legalisation for these apps. E-Hailing services have being well-known among local citizens and foreign tourists in Kota Kinabalu due to a lower and transparent price as well as its friendly driver.

3.1.3. City Buses. There was an economic option to travel to the outlying areas like Tawau, Inanam, Penampang, Luyang and Beverly Hills whereby getting on the Citybus. It is a popular choice among local citizens. These bus stops are scattered around town, and different colours of bus provide different routes. For instance, purple buses go out towards 1Borneo and Sepangar, blue buses go to Likas and Inanam, red buses that will go out past the airport towards Lok Kawi, Kinarut and Papar whereas orange buses that go to Damai, Lintas, Beverly Hills to the KDCA and Donggongon.

3.1.4. Long-Distance Buses. Significantly cheaper travel option with larger and air-conditioned coaches, from in front of the Sabah Court House will take to places like Kuala Penyu, Menumbok, Beaufort and even into Brunei and Sarawak as far as Kuching from the Inanam. Long-Distance Bus Stations, the bus would travel to the east coast, to places like Tawau, Lahat Datu and Sandakan.

3.1.5. Trains. Kota Kinabalu has the train which is being one of the oldest lines in South East Asia. A scenic track with a steam engine operated by The North Borneo Railway which, has since been renovated into a scheduled service, runs between the train station in Kota Kinabalu, Beaufort, and Tenom. Its journey passes along the coast, mangrove swamps as well as paddy fields with water buffaloes. The travel time is way longer for the charter trains as the journey can be designs based on the demand of the group [9].

3.2. Road and Railway System

Uneven road surfaces, deep potholes and absence of street lights have been a common sight along rural roads, particularly in the east coast of Sabah. For those living in these areas, this is an old issue, and they have grown accustomed to maneuvering over and around the uneven terrain, potholes, dirty sidewalks, puddles and damaged roads. The bad condition of the roads and lack of street lightings were hazards which could cause accidents. Hence, people's comfort and safety must be ensured by repairing the damaged roads and installing street lights. For that purpose, the local government has an initiative of upgrading the level of local infrastructure services. Pan Borneo Highway Sabah is one of the Federal Government's projects which are done in order to upgrade the road network which simultaneously helps in enhancing the socio-economic development of the State. Pan Borneo Sabah is expected to be fed by feeder roads from the villages and longhouses in the interior in line with the inclusive policy of the government agenda. These feeder roads will help spur the economic activities of the rural people and connecting the rural to the urban areas.

Meanwhile, in terms of the railway system, the routes for the train services provided in Sabah are from Sembulan to Papar, Beaufort, Tenom and back. The trains move very slowly because they are operated by steam instead of electricity. The trains also need to stop for passengers, hence reducing the travelling speed. Nevertheless, it still becomes one of the attractions among foreign tourists due to the feel of classical train, inherited from the past. Tourists enjoy taking a ride on the North Borneo Railway and relive the nostalgic romance of British Borneo. Due to it being a tourist attraction, the local authority wishes to improve the current railway system as the cost of road maintenance can be very high, and travel by road can be time-consuming compared to trains. The Sabah government is

also looking into upgrading its train transportation system and expanding railway tracks to other major districts. At the moment, there is only one train route from Kota Kinabalu to Tenom, but from Kota Kinabalu to other areas, there is none.

4. Problems on Transportation in Kota Kinabalu

The critical issue with regards to the transportation in Kota Kinabalu is the blooming growth of vehicles on the road which worsening the traffic congestion. Due to that, Chief Minister Datuk Seri Mohd Shafie Apdal mentioned that CityHalls need to plan for an upgrade towards the public transportation system as stated in the Kota Kinabalu Public Transportation Master Plan [9]. Besides, the public transportation facilities provided in Kota Kinabalu also do not meet the needs and demands from the users. This not just the system efficiency which in terms of reliability, but also cleanliness and security provided such as none of the installation of the CCTVs inside busses and stations as being mentioned by Jimmy Wong, Kota Kinabalu MP [3].

Other than that, several problems with regards to the facilities provided including the limited number of the bus stop as in Sembulan, Teluk Likas and Sepanggar. Not just being a residential and industrial area, there are many attractions found in these places. Since the area is frequently visited, there should be a lot of bus stops to ease the user. Lack of bus stop had caused the bus driver to pick and drop the passenger at random spots. This will eventually cause danger to both the bus passenger and the road users. Besides, the parking space provided also limited as in Jalan Putatan, in front of Pasar Besar, KK Plaza Mall and Teluk Likas as well. Due to lack of parking space, the vehicles tend to park on road shoulders, which significantly lead to accidents resulting in injury and even fatal. As an instance, there was an incident at which a lorry crushed two vehicles parked on the shoulder of the North-South Highway near Taiping has resulted killing a college student and breaking the legs of two police corporals. The case is being investigated under Section 41 (1) of the Road Transport Act 1987 for causing death by reckless or dangerous driving [11].

Also, pedestrian bridge or lane should be provided especially in school areas such as in SM All Saints and SK St Agnes. It is crucial in order to ease the road congestions as well as to reduce the accidents occurrence as being mentioned by the Chief Minister Datuk Seri Mohd Shafie Apdal [9].

4.1. Private Vehicles

Private vehicles are the prominent transportation and widely being used in Kota Kinabalu because it allows the user to travels and drives around freely, flexible without the need to follow a schedule like a bus, and there is no need to share the same space with strangers. However, the main issue that private vehicle initiated is that as the population in Kota Kinabalu keeps growing, the more people tend to own private cars caused the road to be flooded with vehicles and ultimately lead to traffic congestion.

4.2. Public Transportation

Public transportation is available in Kota Kinabalu. However, the service provided is unable to achieve satisfactory and the maximum score of the user. The demand for public transportation is relatively low due to its discomfort to the user as well as unreliable schedule. There are times when a user tries to switch to public transport modes, but the services offered are not satisfactory. So the choice that most people in Kota Kinabalu made is to own car but they have to encounter more challenging problems which are to stuck in long traffic jams, fatigue, and many more.

4.2.1. CityBus. Citybus is the bus in the city that has been introduced since 2009. During that time, it receives an overwhelming response and is greatly encouraged to be used due to the low price and being the new type of public transport available in Kota Kinabalu. The path of penetration by Citybus also includes routes that are densely populated such as Sepanggar to Kota Kinabalu, Kota Kinabalu to Likas, Kota Kinabalu to Penampang, Kota Kinabalu to Tanjung Aru and within the city itself. Starting in 2010, Dewan Bandaraya Kota Kinabalu allows only Citybus to go through the streets of Kota Kinabalu in order to reduce traffic congestion [12].

However, when the demand for buses is too high, the limited seats on the bus will be unable to accommodate all the users. Besides, there is no available notice board for the bus schedule causing difficulty to estimate the departure and arrival time of the bus. Some of the buses also do not well-maintained. The broken air conditioner is not being repaired which is inconvenient for the bus passengers especially during the hot day. This poor bus services discourage the road users to use the public transport especially for those who concerns on the reliability and comfort.

4.2.2. Taxi. Taxi from the starting of its introduction has always been one of the significant transportation medium used in Kota Kinabalu city. It offers comfort with air conditioning services provided and more private since the travelling neither in groups nor with the strangers as in the bus. However, the highly expensive fares led taxi service only limited to the users who can afford.

4.2.3. Mini Van. Minivan is among the primary public transport that is usually used until these days. It travels in each time without a lapse of time and can go through the neighbourhoods. The passengers can get to stop in front of their house without having to travel for a long distance. However, the main minivan issue is that it can only accommodate 12 to 15 persons at a time, and this brings difficulty since the demand is high. The fares for a minivan is also relatively high compared to busses.

4.2.4 Rail. The insufficient of trips, the route of the rail network that not linked up to major population centres and its speed are the causes in decreasing of the passengers travel by train in Kota Kinabalu [13]. There are only two pairs of the train a day to service the citizens in Kota Kinabalu which do not meet the needs of the citizens. Trains with the slow speed of 80 km/h are not satisfying the requirement of urbanization. It has to minimise the travel time in order to increase higher productivity. Besides, trains are only available at a particular location including Beaufort and Tenom through Kota Kinabalu, which is inconvenient for the citizens who want to travel to Sandakan, Tawau, Ranau and other destination within Sabah area.

4.3. Non-motorised Transportation

4.3.1. Bicycle. Despite the effort that the government has been giving in constructing a particular lane to encourage more people to use a bicycle as an alternative transportation mode, still, not many people have been implementing it. The reason for this could be that the bicycle as a transportation mode is not practical when it is used to travel to a far and long journey. It will be very inconvenient, tiring and fatigue trying to pedal it all the way. Besides, people in Kota Kinabalu perspective and view towards the idea of using the bicycle as a transportation mode are still not very familiar and acceptable because they much preferred to drive in car with an air conditioning surrounding than the cycling itself.

4.3.2. Walking. Walking has been widely encouraged by the government as well since it brings benefit to promote health, and it is more environmental-friendly than using motorised vehicles. However, the main issue in walking would be that a specific area in Kota Kinabalu has no particular lane or a shared path provided that allows pedestrians to walk safely especially in highway road whereby cars travelled in a relatively high speed, and it is often dangerous for pedestrians to walk on the road.

5. Impact of Transportation System in Kota Kinabalu

5.1. Parking

Based on the statistical analysis conducted by Sabah Economic Development and Investment Authority (SEDIA) about the number of registered vehicles in Kota Kinabalu City, it was stated that 60% of the registered vehicles in Sabah are in Kota Kinabalu as shown in Figure 2.

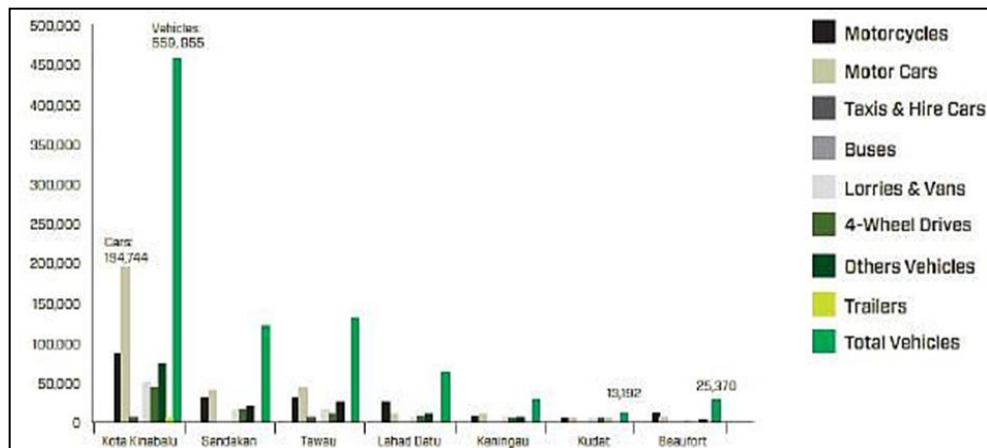


Figure 2: Type of vehicles registered based on various City.

Source: Sabah Tourism Board

This massive number of vehicles concentrated in one city itself is not a good sign for car parking spaces. To date, limited parking spaces problem does not solve even though there are many solutions implemented such as parking charging especially in a commercial area such as a shopping mall, construction of multilevel car park and many more. Sometimes, problem-related to parking in Kota Kinabalu is not due to unavailability of parking spaces, but it is due to lack of information for the car driver about the spaces available in a particular area. Besides that, this problem also due to some unethical driver which often double park. Therefore, problem-related to limited parking spaces is due to several factors such as the ethic of the car driver, insufficient information and weak legal action toward unethical drivers. In order to solve this problem, it is essential to consider all these factors.

5.2. Road Safety

In 2009, Deputy Transport Minister Datuk Abdul Rahim Bakri announced that there were 14,588 road accidents reported in Sabah for the year 2008, with a total of 325 deaths. Kota Kinabalu was announced to have the second highest number of road accidents in Sabah [14]. Then, in 2013, the number of reported road accidents in Sabah was 17,438 with 420 death. Deputy Chief Minister Tan Sri Joseph Pairin Kitingan said that the figure is still considered as manageable [15]. In 2015, the number of road accidents in Sabah increased to 525 cases. This was a 13.63% increase from 2014. State Social Security Organisation (Socso) Director Azhar Md Nadzri considered this figure as worrying. He also announced that study found that 68.8% of the accidents happened while people are traveling to work in the morning. The amount claimed from road accidents in 2015 was RM4.61 million and Socso had received 4,128 claim cases [16]. In 2017, Sabah Road Safety Department (JKJR) Director Herdiansah Abdul Karim announced that deaths due to road accidents in Sabah for the past five years had decreased. This situation signified that the road safety awareness campaign held in Sabah was producing successful results [17]. In the same year, Sabah Road Safety Department Director Josliw Mat Jumping announced that the number of road accidents in Sabah had decreased by two percent. Meanwhile, in terms of number of deaths due to road accidents in Sabah had decreased sharply. Kota Kinabalu was recorded as the fifth highest road deaths in 2017 with 14 deaths [17].

Among the many steps to increase road safety in Kota Kinabalu is the Corporate Social Responsibility (CSR) conducted by different organizations or companies. In 2018, Shell Malaysia for example had launched a road safety campaign named the '#ShellSelamatSampai' in Kota Kinabalu. During this campaign, Sabah Shell had collaborated with Sabah Commercial Vehicle Licensing Board (LPKP) and Sabah Tourism Board (STB) to organize a Defensive Driving Technique Workshop for taxi drivers in Kota Kinabalu [18].

There were four major components in this campaign, which are #SSS School Outreach, #SSS MyLesen, #SSS School Challenge, and #SSS Varsity Challenge. The campaign was aimed to raise

awareness on the importance of road safety among young road users. It involved a number of different schools and universities throughout Malaysia. In Kota Kinabalu, some of the selected schools and university were SMK Sanzec, SMK Likas, SMK Tinggi Kota Kinabalu, SMK Tun Fuad, and Universiti Malaysia Sabah [18].

Meanwhile, Borneo Highway PDP Sdn Bhd (BHP) aimed to promote road safety among road users through a joined forces with the Road Safety Department (JKJR), as part of their CSR. The programmed was primarily focused on Papar where the Pan Borneo Highway Project was currently in construction. BHP is also planning to organize more safety awareness campaign throughout Sabah [19].

Another step taken to increase road safety is by collaboration between government department and organizations. In 2017, JKJR had collaborated with Petronas Dagangan Berhad to conduct JKJR's Chinese New Year road safety campaign in Sabah. During this campaign, 67 Petronas stations had showcased seven road safety tips and reminders on a bunting. Motorcyclists were even eligible to switch their used motorcycle helmet with a new one [17].

5.3. Urban Air Pollution

Similar to other developing cities, commercial areas in Kota Kinabalu city attract and generate relatively large volumes of traffic, particularly during rush hours and weekends, that typically circulate at low speeds with frequent stops and starts. This traffic pattern produces relatively high Carbon Monoxide (CO) emissions. In Kota Kinabalu city, motor vehicle-related pollution has been primarily related to the emission of CO, particularly near roadsides and intersections [20]. Air quality near roadsides and intersections is also affected by several other factors, including traffic density with time, vehicle type, vehicle composition, terrain and local meteorological conditions. CO is the result of incomplete fuel combustion that characterizes mobile as opposed to stationary pollution sources, and therefore, it can be used as a marker for the contribution of traffic to air pollution [21]. Since commercial areas also attract large numbers of people, the potential for human exposure is excellent. Susceptible population groups within the city's commercial area such as in schools, residential flats and apartments and other public places are also a concern over the effect of traffic-related emissions on health and the local environment. These concerns have contributed to the demand for management of urban air quality to ensure a sustainable city.

The maximum Air Quality Index (AQI) in Kota Kinabalu is around 52. According to WHO, it is considered moderate. Meaning to say, it is acceptable, but a minimal number of people who are unusually sensitive to air quality may face moderate health concern [22]. The air quality standard in Sabah considered good except for the occasional periods of forest fires outbreak and a considerable amount of gases emitted from vehicles which entered the atmosphere during the dry season that contributes to high concentrations of particulate matter (PM₁₀), carbon monoxide (CO) and ozone (O₃). Otherwise, all these concentrations as well as concentrations of sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and ambient lead remain relatively low, and thus low Air Pollution Index readings, throughout the year. There were 291,472 motor vehicles registered in 1997 in Sabah, and a total of 1,177 stationary sources of air pollution were recorded, which is increased by 39% at the end of 2018. Several complaints of air pollution resulting from vehicles at Lohan, Ranau and Kota Kinabalu have been reported.

6. Conclusions

The transportation system should be assessed entirely within a broader context, especially on public transportation system as to support sustainable urban transportation development in Kota Kinabalu. Flyover and widening the roads is not the long-term solutions for solving the issue such as the traffic woes in Sabah. Although traffic congestion cannot be eradicated but implementing effective strategies, policy and proper traffic management can reduce the congestion problem from time to time.

Due to the increase of population, prominence should be given to improve the quality of public transportation services in order to attract more users. Restructuring of public transportation

infrastructure and facilities needs to be planned in detail to ensure better services, and this should consist of developing integrated bus terminals, bus stops and pedestrian facilities that are strategic, conducive and safe for users from their home and workplace to the bus stop to improve accessibility, ease and comfort of travelling. City Hall is actively promoting non-motorised transport such as bicycles, whereby they have built an 11kilometre bicycle track from Teluk Likas to Kota Kinabalu as well as Tanjung Aru to Kota Kinabalu, with plans to extend the network further. This kind of cycling infrastructure, including the path and parking space that is provided, will allow people to cycle to reach the terminal and left their bicycles securely while using the bus. Hence, enlarging the area for public transit corridor that can connect with the cycling infrastructure will help in attracting people to use public transit. Allowing people to walk and the cycle will help in reducing congestion on our roads as well as overall carbon footprint.

Other than that, advanced and more magnificent capacity transport facilities such as the Light Rail Transit (LRT), Monorail or tram needs to be planned early as the population is growing. Statistics from the Malaysian Statistics Department has proven that the population of Greater Kota Kinabalu (including Kota Kinabalu, Tuaran, Penampang, Putatan and Papar) has increased by 169,082 after 10 years starting from 2000 and based on average population growth of 2.5%, it is estimated that Greater Kota Kinabalu will have a population of about 1.1 million by 2020. Even though the capacity to allow LRT and Monorail have not reached yet, but five years from now the population will be sufficient for that.

In a nutshell, city planners responsible to look for alternatives in order to provide a reliable, modern and high passenger capacity transportation system that is incompatible with the cities infrastructural and population growth which will be sustained for many more years ahead.

Acknowledgments

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References

- [1] Daily Express 2015 *Sabah's transport system is lagging*. Retrieved form 25 April 2019. <http://www.dailyexpress.com.my/news.cfm?NewsID=103985>
- [2] Sentian J and Ong P T 2015 *Carbon Monoxide 'Hot-Spots' In Urban Area Of Kota Kinabalu City, Sabah*. School of Science and Technology
- [3] Daily Express 2014 *Sabah traffic congestion worsening: DAP*. Retrieved from 28 Mac 2019 <http://www.dailyexpress.com.my/news.cfm?newsid=88858>
- [4] Mohd Noor H. and Md Nor A R 2016 *A Case Study of Socioeconomic Influence on the Use of Public Transport in Kota Kinabalu Urban Area, Malaysia*. Jurnal Kinabalu, **19**. Retrieved from <https://jurcon.ums.edu.my/ojums/index.php/ejk/article/view/507>
- [5] Property Hunter 2014 *The blooming of Greater Kota Kinabalu*. Retrieved from <https://www.propertyhunter.com.my/news/2014/06/826/sabah/the-boomingof-greater-kota-kinabalu>
- [6] Salleh A Puyok A and Bagang T P 2019 Constitutional Asymmetry in Malaysia: A Case Study of Sabah and Sarawak. A Country Study of Constitutional Asymmetry in Malaysia *in Constitutional Asymmetry in Multinational Federalism* 315-340
- [7] Muguntan Vanar 2019 *More tourists heading to Sabah*. Retrieved 21 April 2019 <https://www.thestar.com.my/news/nation/2019/02/20/more-tourists-heading-to-sabah-state-records-rm8bil-in-tourism-receipts-and-39-million-arrivals/>
- [8] Trip Advisor Malaysia 2019 *Public Transportation* Retrieved 21st June 2019 <https://www.tripadvisor.com.my/Travel-g298307-s303/KotaKinabalu:Malaysia:Public.Transportation.html>
- [9] The International Steam Pages 2001 *The North Borneo Railway Project* Retrieved on 10th September 2019. <http://www.internationalsteam.co.uk/trains/borneo.htm>
- [10] Daily Express 2019 *KK's public transport needs upgrade: Shafie*. Retrieved 22 Mac 2019

- <http://dailyexpress.com.my/news.cfm?NewsID=125589>
- [11] The StarOnline 2019 *Lorry rams into two cars on highway shoulder, kills a college student, breaks legs of two cops*. Retrieved on 22 Mac 2019. <https://www.thestar.com.my/news/nation/2018/04/26/lorry-rams-into-two-cars-on-highway-shoulder-kills-a-college-student-breaks-legs-of-two-cops>
- [12] Muhammad Ismail Bin Jaffar 2014 *A Study on Public Transport Quality of Service from User Point of View (Case study: Kota Kinabalu)*. University Malaysia Pahang
- [13] The StarOnline 2018 *Sabah to improve rail system that's slower than a 'kerbau' now* Retrieved on 24 Mac 2019 <https://www.thestar.com.my/news/nation/2018/10/27/sabah-to-improve-rail-slower-than-kerbau>
- [14] The Star Online 2019 *Road accidents claim 325 lives in Sabah last year*. Retrieved on 25 Mac 2019. <https://www.thestar.com.my/news/community/2009/05/07/road-accidents-claim-325-lives-in-sabah-last-year/#c5vidGiTsA8rbmr6.99>
- [15] Daily Express 2014 *17,438 road accidents recorded last year with 420 fatalities*. Retrieved on 25 April 2019 <http://www.dailyexpress.com.my/news.cfm?NewsID=93514>
- [16] Borneo Post Online 2016 *Road accidents up 13.63% in Sabah*. Retrieved on 25 April 2019. <https://www.theborneopost.com/2016/04/08/road-accidents-up-13-63-in-sabah/>
- [17] Borneo Post Online 2017 *Sabah road fatalities decreasing* Retrieved on 22 Mac 2019. <https://www.theborneopost.com/2017/12/22/sabah-road-fatalities-decreasing/>
- [18] Shell Malaysia 2018 *#ShellSelamatSampai Urges Youth to Change Behaviour & Pledge for Safer Roads for All*. Retrieved on 26 April 2019. <https://www.shell.com.my/media/2018-press-releases/shell-selamat-sampai-pledge-for-safer-roads.html>
- [19] New Sabah Times 2019 *Borneo Highway PDP and JKJR in road safety promotion*. Retrieved on 25 April 2019. <http://www.newsabahtimes.com.my/nstweb/fullstory/29127>
- [20] Sentian J 2003 *Study of temporal and spatial variations of nitrogen dioxide (NO₂), ozone (O₃) and Carbon monoxide (CO₂) in Kota Kinabalu City*. B-08-03-01-ER/U14, Universiti Malaysia Sabah
- [21] Fenger J 1999 Urban air quality *Atmospheric Environment* **33** 4877-4900
- [22] The World Air Quality Project 2009 *Kota Kinabalu, Sabah Air Pollution: Real-time Air Quality Index (AQI)*. Retrieved on 23 April 2009. <http://aqicn.org/city/malaysia/sabah/kota-kinabalu/>